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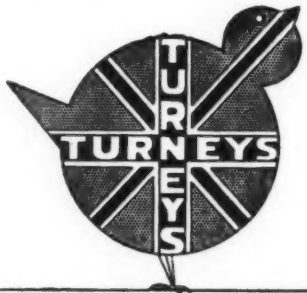

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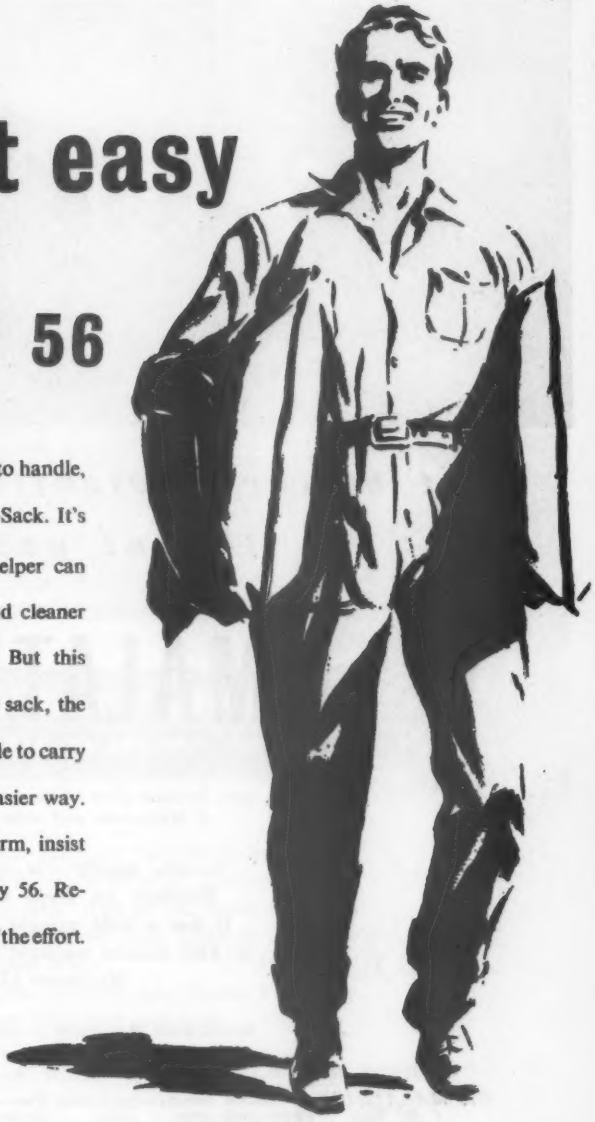

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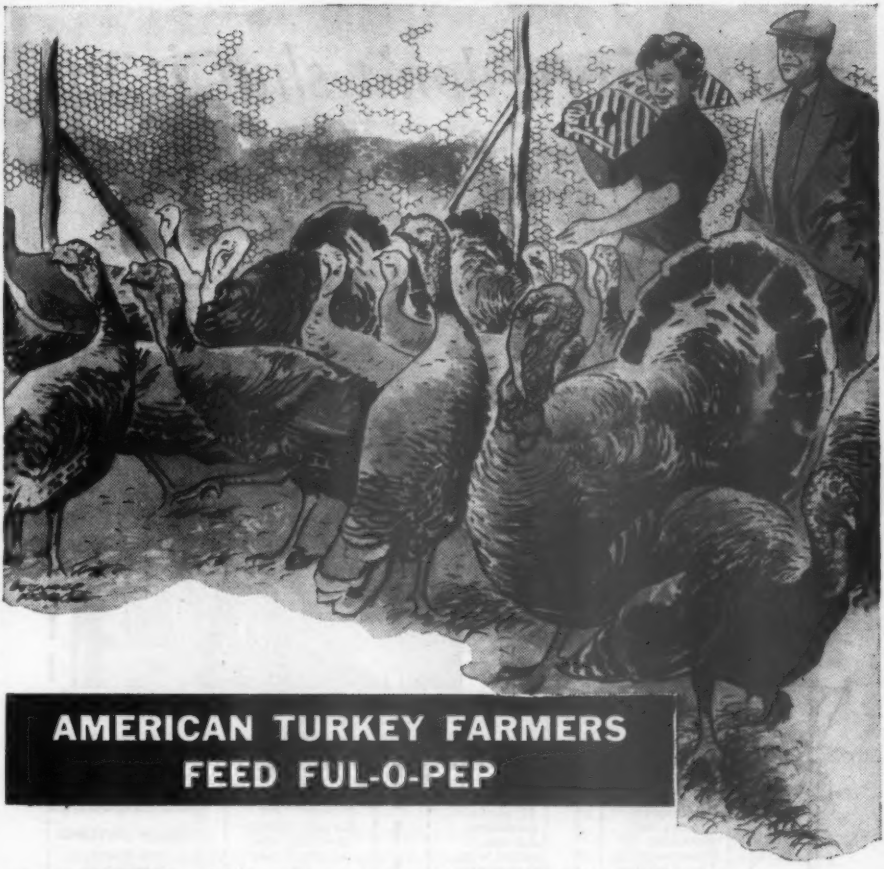

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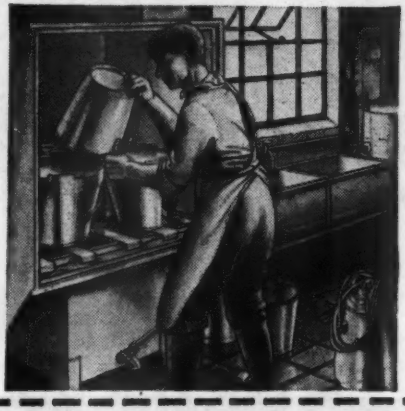

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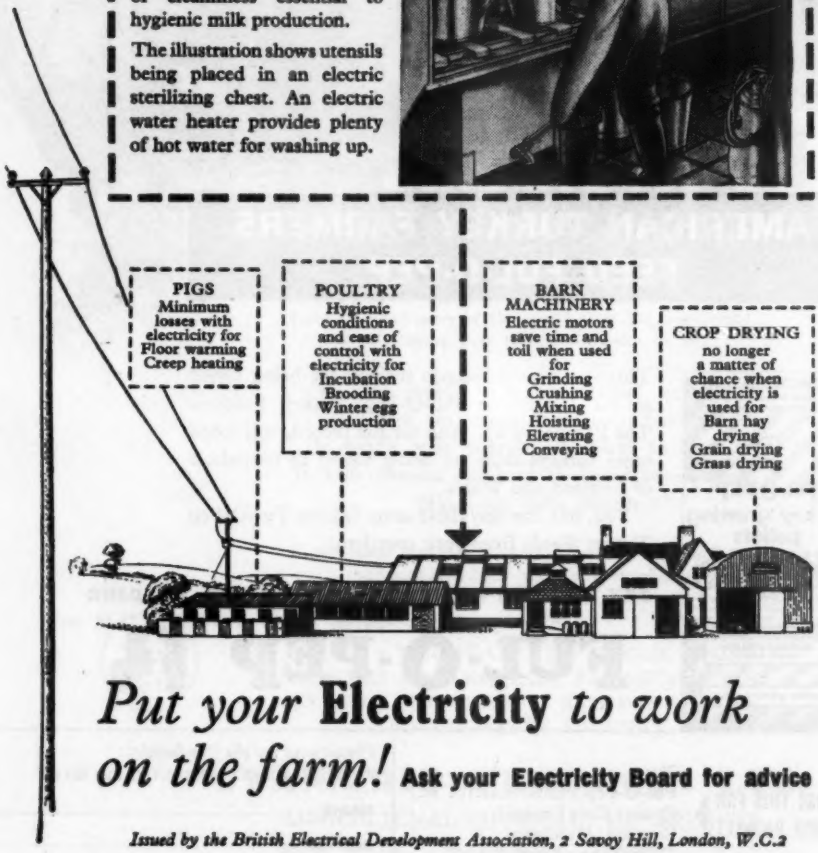

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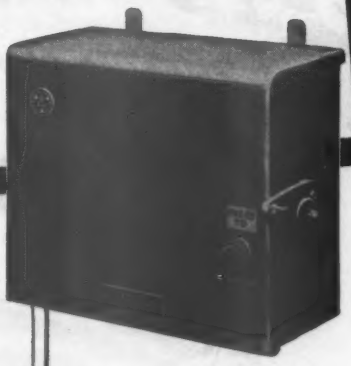

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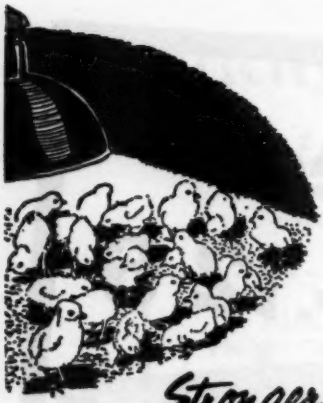

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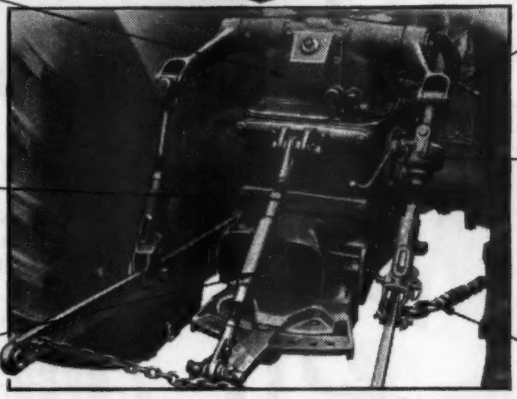

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Old Pack Horse Bridge, Wasdale, Cumberland

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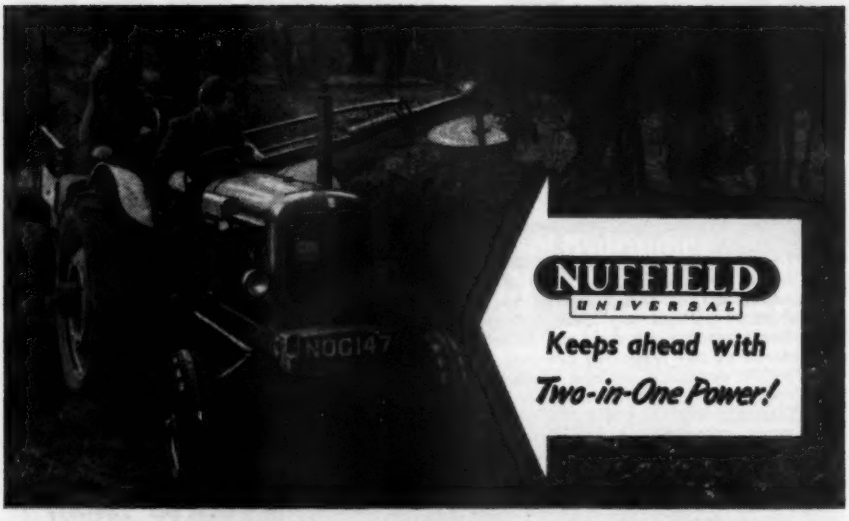

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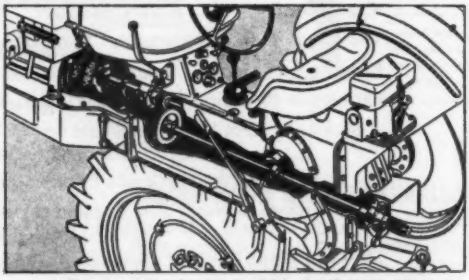

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AGRICULTURE

VOL. LXIII No. 4 JULY 1956

MEAT FROM THE HILLS

L. D. C. McLEES, B.Sc., N.D.A., N.D.D.

Provincial Director, National Agricultural Advisory Service, Northern Province

Mr. McLees looks to the rich potential of our hill and upland farms to provide more sheep and cattle for the butcher. There are difficulties, but none which confidence in the future cannot overcome.

WHEN two years ago thought was first given to the Ministry's exhibit at the "Royal" at Newcastle, we were unanimous that it must illustrate in some way the problems of the upland areas of the four northern counties. Milk production, the most popular subject for such exhibits, was even then in precarious balance with liquid consumption. Poultry and eggs, bacon and pork, and even horticulture, have, with milk, their importance in the north. But outside the more fertile lowland areas, where these products are traditional, there is a large reservoir of land and of farming experience and skills, none of which has yet been fully deployed in the drive for higher production. It was therefore to this untapped wealth that we looked for our theme.

The aim of the Ministry's exhibit is to picture these upland and hill areas as, to an increasing degree, the source of stores for finishing as beef, mutton and lamb on better land. The problems are not new or simple. The fact is that if the nation wants home-produced meat, here is a potentially suitable area of land, some of it bleak and inhospitable, but some with a surprisingly high potential. Too much of it, however, is ill-equipped at present to discharge to the full the function for which it is best suited—the production of store cattle and lambs for the feeders and milk producers, and this almost entirely in self-sufficiency.

Confidence in the Future The first, and obviously the most important, of the several factors involved is that all concerned—owners, occupiers and workers—must have confidence in the long-term future of meat production at home. To develop the full potential of hill and "marginal" land, requires new capital and labour. The uplands must attract and not repel the right type of people, and this means housing and modern amenities on the spot or within easy reach by means of good communications. The existence of a happy and prosperous people in these areas is a national asset of incalculable value.

Something has been done. Fostered by the higher prices for store cattle, sheep and wool which have ruled in recent years, encouraged by the promise of a continuing demand for home-produced meat, and assisted by grants under several schemes, a considerable number of owners and occupiers have

invested in their holdings. New permanent equipment, such as housing, fencing, farm buildings and shelter, has been provided, and the old has been improved. The land also has been rehabilitated, although drainage, which, even after taking account of grants available is unfortunately a very costly matter, is all too often an essential preliminary to land improvement.

In general, the predominant stock, although not necessarily the principal source of farm income, are sheep. In the Durham dales, for example, the coming of the Milk Marketing Board twenty-two years ago hastened a change from the rearing of cattle to the production of liquid milk, because of the greater financial security attached to it. Milk is an important source of income in the west of the area also. Traditionally the system in Cumberland and Westmorland is linked with the export of dairy replacements, second- and third-calved cows, and beef stores. The effect of the present milk regulations and of the rising collection costs could be to put a proportion of producers out of the liquid milk business and force them into cattle rearing. The development of artificial insemination has made available an easier method of improving the cattle both for milk production and, by the use of semen from suitable breeds of bull, for calves to be reared as beef stores. Elsewhere on the "marginal" areas—for example, in Northumberland—suckler herds are increasing. There is much to be said for the principle of one-cow-one-calf under these conditions.

The four northern counties between them carry over 16 per cent of the national sheep flock and nearly 9 per cent of the cattle. Generally, the quality of stock, especially the sheep, is good, and the standard of flock management on the hills is second to none. It is surely in the interest of all concerned that the maximum use should be made of this skill. It is true that some competent observers, including some experienced members of the N.A.A.S., have said that the sheep population should not increase further. In so far as this is a veterinary problem, great progress has been and will continue to be made in providing the answers. The really serious difficulties in materially increasing the production of both sheep and cattle are shelter and keep.

More and Better Keep The effect of the natural sparseness and poor quality of summer keep is worsened by a short grazing season and consequently a long winter. Most of the cattle have to be housed and fed. Provision has to be made for sheep against the risks of heavy snow, as in the last two winters. Because of this perennial shortage of keep, and because it is claimed to be necessary to maintain the size and constitution of the sheep, it has long been the practice to winter away the ewe lambs intended as flock replacements. Finding these wintering grounds is becoming increasingly difficult and expensive.

Experience from marginal production and other schemes designed to help the economy of the upland areas provides ample proof that something can be done on most farms to improve the amount and quality of keep. Everywhere are green islands of improved land. Some are small and isolated; others are larger or are grouped as a sort of archipelago; but each is providing more and better keep as fresh grass, silage or hay, or sometimes as tillage.

One farm in Durham County comes to mind in this context—a holding at 1,000 feet which was nearly all rough grazings only a few years ago. Improvement under the Marginal Production Scheme has not only increased the stock-carrying capacity about threefold, but has allowed the original hill breed of ewes to be replaced by heavier and more prolific cross-bred ewes. It has also led to a comprehensive scheme under the Livestock Rearing Act to provide buildings for wintering cattle and amenities for the farmer and

his family. This last is important, for higher output from the hills means more labour, and today this will not be kept, far less attracted, without good housing.

No Common Formula This example may be exceptional. Certainly it is unusual in the degree to which it has been possible to carry out improvements while still maintaining a balance between summer carrying capacity and the needs of shelter and keep in winter. There is, of course, no common formula. Each case has to be dealt with on its merits and becomes, in point of fact, a study in farm management, the answer to which depends mainly on the resources in land and capital available, together with the personal qualities of the owners and occupiers. In other words, just the sort of study which the advisory services are fitted and willing to undertake. The results of the examination will be put before the farmer, with whom naturally the responsibility for taking the decisions rests. Much depends on the proportion of land at the intermediate levels that is capable of being improved economically at a cost, after allowing for grants, which the farmer can afford. In general, therefore, the right approach is a rate of progress geared to the farmer's financial and other resources. Given confidence in the future and co-operation between the practical man and his technical friends, there could, however, be much more meat from the hills.

A FEW FIGURES

	Northumberland	Cumberland	Westmorland	Durham
Cattle and calves ...	214,470	242,595	104,803	126,292
Pigs	44,328	33,727	6,574	60,994
Sheep and lambs ...	967,665	611,041	438,522	262,539
Poultry	453,664	1,101,039	353,800	673,752
	acres	*acres*	*acres*	*acres*
Temporary grass ...	100,280	146,041	26,334	73,460
Permanent grass ...	357,768	255,987	160,475	164,220
Rough grazings ...	446,858	247,142	126,167	67,657
Oats	45,399	49,837	9,671	49,458
Turnips and swedes (for stockfeeding) ...	19,272	15,930	3,688	11,054

THE ROYAL SHOW AT NEWCASTLE

SYDNEY MOORHOUSE, F.R.G.S., F.Z.S.

Seven times the Royal has been staged on the Town Moor at Newcastle, the first visit being in 1846, when 13 acres were sufficient to accommodate the show, and spectators were numbered in their tens of thousands. It is a far cry from there to the modern show, with over 150 acres and a prospective attendance approaching the 200,000 mark.

FOR the seventh time since the Royal Agricultural Society of England came into being in 1838, Town Moor, that amazing expanse of 900 acres of open grassland on the outskirts of Newcastle upon Tyne, provides the setting for Britain's premier agricultural show. Indeed, the Society had been in existence for only eight years when its annual exhibition was first brought to this open space. Town Moor itself provides quite an interesting study. It first came into prominence when, in exchange for lands used in an extension of the castle during the reign of King John, the burgesses of Newcastle were granted pasturage rights there at a fee farm rent of £100. In 1671, however, the fee farm rents were bought by a member of the Ealmann family of London, whose descendant eventually resold them for £2,200 to the Mayor and Corporation of the City of Newcastle in 1885. Today, the Freemen of the City are still permitted to graze 800 cattle on the open space in pursuance of the ancient right, and every seventh year 100 acres of the moor are enclosed and let by auction. It is in this section that the Newcastle United Football Club has its ground. Time was, too, when an annual St. Martin's Day Fair was held at the highest point of the moor, appropriately known as Cow Hill. The charter for this fair was granted by Henry VII, and in a Board of Agriculture report for the year 1880 it is described as one of the largest gatherings of its kind in the north of England.

First Royal at Newcastle By the time the Royal paid its first visit to the Tyneside city in 1846, it had already established itself as the most important event of the agricultural year, and, in keeping with its increasing prestige, the area required to house it was rapidly extending. Thus, although the 13 acres of Town Moor which were enclosed to serve Newcastle's initial Royal seems small when compared with the 150 odd acres that will be needed this year, it was double that deemed sufficient at Oxford seven years before.

For this first show, the cattle classification was limited to Shorthorns, Herefords, Devons, and "Other Breeds", but in order to cater for local breeders, the sheep section was extended to those "of mountain breed", thus providing for the Blackface and Cheviots, in addition to the Leicesters, Southdowns and long-woolled breeds set out in the original schedules. It is interesting to note that this year the organizers have again extended the sheep section by introducing two new classes for the Border Leicester-Cheviot cross, generally regarded as the "rent-payer" of this part of the country.

There seems little doubt that at the first Newcastle Royal, the Shorthorns made as fine a display as had then been seen among the cattle at any previous show, for the breed had a long association with the counties both north and south of the Tyne. From Tudor times, the Earls and Dukes of Northumberland had kept the native short-horned cattle on their estates around Alnwick, and it was on this strain that, in the second half of the eighteenth century, John Maynard and the Colling brothers, Robert and Charles, carried out those improvements which were to set the standard for

the breed. Robert Colling bred the famous bull "Comet", whose name was soon figuring prominently in many pedigrees; Charles was the breeder of the almost fabulous "Durham Ox", which is said to have weighed over 3,000 lb at the age of five.

Later, the Colling's herds were broken up, the chief buyers being Thomas Bates and Thomas Booth. Bates was mainly interested in the dual-purpose Shorthorn, and Booth primarily concerned with beef. Both were, of course, still prominent figures in the Shorthorn world at the time of this 1846 show, but Bates had quarrelled with the promoting Society over the methods of judging and did not show. The name of Booth, on the other hand, appeared in the list of prize-winners. The championship, however, went to a roan bull named "Belvedere", which had been bred by a Mr. Hopper, of Hockton.

Even in those days, the implements section of the show was important, there being 735 implements entered, housed in fourteen sheds each 250 feet long. The biggest premium of the show was offered for the best tile-draining machine, and this was won by a Cheshire exhibitor—Thomas Scragge, of Tarporley. Here, too, was a patent brick machine invented by an American, Alfred Hall, and manufactured by Ransomes, in which clay was passed through a pug mill into a series of moulds. The resultant bricks could be produced at the rate of between 8,000 and 10,000 a day. There was, however, only one steam engine on view, and this created so great a commotion that there was an animated discussion at the Society's Council meeting as to whether it was safe to allow it to get up steam in the showyard. And when members of the Society were not looking at stock or wandering round the implements section, they listened to lectures on such topics as manuring and drainage.

The Show Grows Eighteen years later, in 1864, the Royal came north to Newcastle for a second time, and not only was the area extended to cover 42 acres, but the livestock section was greatly increased. Sussex, Channel Islands, Ayrshire, Scottish polled, and Scottish horned cattle were added, and the sheep included Leicester, Cotswolds, Lincoln and other long-woolled breeds, Oxford Downs, Southdown, Shropshire, Hampshire and other short-wools, with, as on previous occasions, Cheviots and Blackface.

Once again, the Shorthorns, with 175 animals forward, made the outstanding display of the cattle section. The male championship this time went well north of the Border to a beast named "Forth", exhibited by Amos Cruikshank, of Sittyton, Aberdeenshire—a Quaker who had set out to produce a breed suited to "our country, our agriculture and our people." By mixing the strains of such English breeders as Booth and Bates with that of Captain Barclay of Ury, he became generally regarded as the founder of the Scotch, or beef, Shorthorn.

The second half of the nineteenth century saw the first real sign of interest in farm mechanization, and this 1864 show was preceded by a four-day trial for steam cultivators and the like on 184 acres at Long Benton, just outside the city. These trials naturally attracted a great deal of attention, and a correspondent in the *Newcastle Daily Chronicle* of July 13, 1864, vividly described the opening scene:

> The judges, after examining the engines and arranging what appeared to the uninitiated a chaotic mass of ploughs with their ends elevated, not unlike fire engines, scarifiers, cultivators, and then varied trestle-like supports for the ropes, gave orders for a preliminary trial. Each engine set up a column of smoke and while the engineer was seeing that all was right for working and the stoker was looking after the fuel, others were getting ready the ploughs and other gearing.

The third show at Newcastle, in 1887, coincided with Queen Victoria's Golden Jubilee, and there was a visit from the then Prince of Wales, later King Edward VII. By now, the machinery trials had been abandoned, but, encouraged by the Dukes of Northumberland, who twenty years before had instituted a scheme for hiring steam tackle to tenants, mechanization was well under way in many parts of the county. Instead a new development—silage-making—was attracting some attention, and silage-cutting machines created a good deal of interest at the show. A discussion on the subject was not very encouraging, many farmers dismissing it as merely a craze of the moment.

This show was also noteworthy as the beginning of the effort made by the R.A.S.E. to encourage light-horse breeding, and for the finest collection of stock seen at the Royal for many a year.

A Prosperous Site Twenty-one years later, the Royal was back again on Town Moor, and to mark this fourth visit over 200,000 folk of the North Country came along to assist the promoting Society to make a record profit of £10,154. It would, indeed, seem that Newcastle was determined to establish itself as the Royal's most prosperous site, for although a venture into Wales in 1919 put Cardiff in the lead with £12,039 profit, when a return was made to the Town Moor in 1923 a new record of £19,102 was established. This figure was not exceeded until 1947 at York.

I have already referred to the area's time-honoured link with the Shorthorn breed of cattle, and it was significant that it was in 1923 that the Colling cup contest for the best beef Shorthorn beast in the show was inaugurated. The first winner of this trophy, which is still competed for, was one of the most famous breeders of modern times—the late "Bertie" Marshall, of Stranraer.

The sixth visit of the premier Society to the Town Moor in 1935 was a royal occasion in more ways than one. The late Duke of Kent was President of the year and he had the pleasure of seeing a Shire horse owned by his father, King George V, win the stallion championship.

So we come to 1956, and, with the exception of York in 1947, the first visit of the Royal to the North-East for twenty-one years. Of two things we can be sure; it will be by far the largest agricultural show Tyneside has seen, for despite the tremendous feats of organization which it calls for, the showground area continues to increase almost yearly. The other certainty is that, whatever the destination of the various championships, the area will again be honourably represented in the Shorthorn classes.

FARMING BETWEEN THE HAMMER AND THE ANVIL

J. R. JUDSON, B.Sc., N.D.A., N.D.D.
County Agricultural Officer, Northumberland

We'll see nae mair
The sea banks fair
And the sweet, grey, gleaming sky
And the lordly strand of Northumberland
And the goodly towers thereby.
Swinburne

THIS nostalgia of the exile is too much to expect of the casual visitor wending his way home from the Royal at Newcastle, but it is certain that those who can find time to "stand and stare" will at least leave with pleasant memories of a county described by a medieval writer as being "between the hammer and the anvil" of Scotland and England.

For the historian and antiquarian, Northumberland is a veritable gold mine of camps, castles, standing stones, sculptured rocks, peel towers and battle sites. The Priory of Lindisfarne, Hadrian's Roman Wall and Flodden Field are all to be found within its borders. To the industrialist it is not so much a gold mine as a coal mine; certainly the Ashington coal field is one of the largest in the world and is largely the reason for the engineering, the ship building and the factories centred on the busy port of Newcastle upon Tyne. For the naturalist and country-lover there is a mine of wealth too, whether one thinks of the sea-birds and seals of the Farne Islands, the salmon and trout of Coquet and Tweed, the long sweeps of sandy beaches, the whinstone rock escarpments with their faces lifted to the north-east, or the wide expanses of grassy hill and heather moor. To the agriculturist, the county's wealth is not in its history, its industry or its scenery, but in the quality of its stock and the skill of its stockmen.

Broad Picture The broad farming picture is of a large county with large farms, with a marked emphasis on the breeding, rearing and feeding of sheep and cattle. Its one million acres may be no more than an accident of history, but there are sound reasons for its one million sheep and the fact that seven out of every eight acres are in grass.

Apart from the granite and lavas of Cheviot, rising to 2,700 feet in the north-west, rock outcrops and very limited areas of sands, gravels and alluvia in the river valleys, boulder clay of glacial origin covers the county like a blanket. Although it varies considerably in quality, it provides, in the main, a rather cold, stiff, slow draining, phosphate-deficient soil, slow to warm up in spring. It is, however, drought-resisting and capable of high production if well drained and properly handled. On the coastal plain, which extends right down the eastern side of the county, with a rainfall of 25-27 inches, it carries both excellent feeding pastures and heavy crops of corn.

The coastal plain, however, is narrow; for the most part no more than about six miles wide. From it the land rises gradually to the west, and over half of the county lies above the 600 feet contour. The boulder clay thins out as the elevation increases and there are numerous outcrops of whinstone, limestone and fell sandstone. Rainfall increases, too, to the westward, ranging from 30 inches up to 60 inches on the western border. The picture here, therefore, is of an exposed upland area varying in altitude from 600 to

2,000 feet, with thin, poorly drained soils, often pretty close to the rock. Ploughing is out of the question, except in the river valleys and on some of the lower "marginal" slopes. The bulk of the herbage is either bent and nardus ("white" land) or heather ("black" land) and, in fact, almost half the county is classified as rough grazing.

It is against this background of boulder clay and grass that the work of Gilchrist and Somerville at Cockle Park, the county experimental station of world-wide fame, stands out so clearly as a major scientific contribution to farming practice and progress. In particular, they clearly demonstrated and measured the value of basic slag for the improvement of heavy grazing land and of balanced manuring for the hay crop, thus laying the foundation for the improvement of tens of thousands of acres in Northumberland alone.

Tillage The 140,000 acres of tillage crops are distributed fairly widely over the lower ground, but there are two widely contrasting areas where arable cropping is of particular importance; the Tweedside and Glendale area in the north and the industrial south-east. The former is purely rural and unspoiled, at a disadvantage in some respects by reason of its distance from consuming centres. The farms are large, highly mechanized, and cropped on a ley system with comparatively little permanent grass. The soils range from glacial sands to heavy loams. There is a high sheep population. Barley, sugar beet, and potatoes are the main cash crops.

Times have changed since the rhymester at Lindisfarne wrote:

> *From Goswick we've geese, from Cheswick we've cheese,*
> *From Buckton we've ven'son in store;*
> *From Swinhoe we've bacon but the Scots hae it taken*
> *And the Prior is longing for more*

—but, rather curiously, large-scale pig and poultry units are fairly common.

In the south-east "beauty has been sacrificed to industry". Producers here have all the advantages and disadvantages of farming in a highly industrial area—a market on one's doorstep for both farm and market-garden produce, with the attendant colliery heaps, deep-mining subsidence, opencast coal, smoke, trespass, dogs, and building development constantly stretching out its tentacles to grasp more and more agricultural land. Milk production is a prominent feature of the area. Wheat and potatoes are the main cash crops; sheep husbandry is almost impossible.

Market Gardening Horticulture is not a strong feature of the county, neither climate nor soil being particularly favourable, but of the 1,200 acres of horticultural crops and the 24 acres or thereabouts of glasshouses and frames, a substantial proportion is located in the south-east. Around Morpeth, about fifteen miles north of Newcastle, is a long-established market-garden area, specializing in vegetable crops, particularly Brussels sprouts and cabbage. The main glasshouse area is centred at Ponteland, eight miles north of Newcastle. Here tomatoes and chrysanthemums are by far the most important crops; some growers specialize in carnations and sweet peas; most produce forced bulbs for the early market. Elsewhere holdings are scattered, mostly small, and with mixed cropping ranging from vegetables to strawberries and other soft fruit, ornamental trees and shrubs, and bedding plants.

Fattening The feeding areas stretch from Morpeth north to Berwick and south-west to Hexham. Typically, farms are about half permanent grass and half temporary grass and tillage, the common rotation being ley, two years corn, green crop and one or two years corn. To the risks and

difficulties of high and increasing capital investment in store cattle and breeding ewes, decontrol has added the uncertainties of the free market. Fatstock prices are almost bewildering to the feeder trying to produce "quality" meat. Profit margins, bearing in mind the capital involved, are very small. Grain crops for sale are, therefore, a very necessary counterpoise, while the straw and the swedes from the rootbreak provide good keep for wintering cattle inside, thus enabling the feeding pastures to be winter rested.

Systems vary greatly, but usually there are two peak periods for buying stores—in the autumn, when the selling of fat cattle is at its peak; and in the spring, to cope with the spring flush of grass. Selling off the grass begins in June and increases as grass declines in quality and quantity. A high proportion of the cattle fed are Irish Angus-Shorthorn crosses, of which about 60,000 to 65,000 are imported into the county annually. Supplies of home-bred cattle are increasing and the best are at least as good as the Irish, but the latter retain the advantage of being available in large numbers and regular lots most of the year round.

The ewes on these farms are the North Country or "Scotch" Halfbred (Border Leicester × Cheviot). There is a sprinkling of other cross-bred ewes, such as the Suffolk cross (Suffolk × Halfbred) and the Mule (Border Leicester or Hexham Leicester × Blackface), but the Halfbred has held pride of place for a long time and is likely to continue to do so. She is prolific, a good mother and a good milker. Combining the mutton qualities of the Cheviot with the early maturity of the Leicester and having the advantage of hybrid vigour, she is eminently suitable for crossing with a Down ram for the production of fat lamb.

Again, the free market has brought its problems. It has been the practice on many farms in recent years to sell most of the home-bred lambs fat off the grass and to buy in lambs for finishing on roots or for selling as young sheep the following spring at twelve to fifteen months of age. The demand for lightweight lamb, however, has made the production of heavyweight sheep something of a guessing competition. It is too early yet to say how the market will eventually settle down, but many are convinced that the long-term answer is an increase in the number of breeding ewes. For similar reasons a certain amount of experimentation is going on with Down rams of various breeds. The Suffolk is still very widely used, but the Oxford has lost ground to some extent. Others being tried are the Hampshire and the Dorset.

Rearing West of the feeding land come the "marginal" areas, essentially devoted to the breeding and rearing of cattle and sheep. The tillage area is very limited and confined in the main to a few acres of oats and perhaps some broadcast green crop. The meadow acreage is not so limited as on the hill proper, and labour and buildings are probably the limiting factors, rather than winter keep.

The true hill farms are large and essentially sheep farms. Though Galloways and the well-known "Blue-Greys" (White Shorthorn × Galloway) are common in the south-west around Haltwhistle, hill men in general are not in favour of too many cattle. They compete with the sheep for winter grazing and for the limited amount of hay from the usually much restricted acreage of meadow. Alternatively, there is not much pay in buying store cattle in spring when prices are high and selling in autumn when prices are low.

The Border Cheviot predominates on the dry, grassy, steep-sided, rounded Cheviot foothills, the Scotch Blackface on the less steep and wetter ground

in the centre and south. Sheep management follows a pattern which basically has changed very little for many generations—by the nature of things, a relatively inflexible pattern, determined to a large extent by the amount and variety of natural herbage. Success depends on keeping the flock in proper balance between the natural resources of the farm on the one hand and the requirements of the wool buyer and store lamb buyer on the other. Let a man keep too many sheep, or lean too far in the direction of size and length, or get the wool too fine or the coat too heavy, and nature levies her toll.

Full use has been made on the hill and marginal farms of the opportunities afforded by improved economic conditions and Government grants to repair the ravages of the 'thirties and to carry out improvements. Twelve thousand acres have been reseeded and 40-45,000 acres improved by surface treatment under the Marginal Production Scheme. The 470 farms for which improvement schemes have been approved under the Hill Farming and Livestock Rearing Acts extend to about 350,000 acres, and the total gross expenditure involved is in the region of £2 million.

Milk Just a word about milk. There are some 1,400 producers scattered around the county, with two main dairying areas—the south-east and the south-west, especially around Hexham and in the dales of East and West Allen.

The dual-purpose Shorthorn has been and still is, despite the demand for beef stores, giving way to the specialized dairy breeds, particularly the Ayrshire and the Friesian. Attestation is increasing rapidly, buildings and dairies are being put in order and there is an increasing emphasis on the intensive management of grass for grazing, hay and silage.

The dales and Hexhamshire area stand out in marked contrast to the rest of the county in that the holdings are small family farms, often not more than 50 acres. With a restricted acreage, poor land, and long winters, milk production is both their problem and their salvation.

Men In closing, may I pay tribute to the Northumbrian farmer and farm worker. There are those who would say they are conservative. Perhaps they are. Or it may be that, having lived for so long between "the hammer and the anvil", they are merely cautious. However that may be, when it comes to stock sense and a real respect for the land, they stand second to none.

★ *NEXT MONTH*

Some articles of outstanding interest

Winter or Summer Milk Production? by V. H. BEYNON and J. A. LANGLEY of the Economics Department, University of Bristol ● The first of a series of articles on the Ministry's Experimental Husbandry Farms: **Bridget's Farm** by W. D. HAY ● **Planning the Dairy Farm for Profit** by G. P. CHITTY, N.A.A.S., Worcester.

FARMING IN THE NORTH-WEST

T. WILLIAMSON, N.D.A., N.D.D.
County Agricultural Officer, Cumberland

Here stupendous Alpine mountains rear
Their rocky sides, and rushing torrents roar:
There the smooth expansive Lake, the fertile Vale,
And cultur'd Fields, and Gardens smile around;
And careless herds and flocks securely stray.

ALTHOUGH Cumberland is one of the larger counties in England, it is probably a little too remote to be very well known in the agricultural sense. Those not acquainted with the county possibly think of it as mainly rough grazing, largely covered by mountains and lakes. Most, however, would admit its claim to importance for the rearing and export of livestock.

The first impression of Cumberland is of its excellent grasslands; rain is said to fall on 200 days in the year! A visitor would also notice the intensive mixed stocking in the lowlands; the well-wooded landscape; the strong thorn hedges on earth banks; the solid stone farmhouses and buildings; the dry stone walls in the upland areas. Inquiry would reveal that most of the farms are family farms, in the main with employment for not more than one man or a lad.

It would be a mistake to think of the county as predominantly mountainous, since the Lake District is contained within a circle of less than 16 miles radius. Furthermore, the county has a long coastline and much of the land is at no great height above sea level. Perhaps half the county could be termed lowland; about a quarter is above 1,000 feet. At the other extreme is Scafell Pike, the highest point in England, which rises to 3,210 feet.

With this sort of topography in mind, it is not difficult to appreciate the great variation also in rainfall. Amounts vary from 30 inches a year in the lowlands near the Solway Firth, to more than 180 inches in the hills at Seathwaite in the Lake District. The latter, incidentally, claims the heaviest rainfall record for the British Isles. The Irish Sea and the prevailing winds combine to bring to the North-West a much milder climate than one normally associates with the North.

Half a million Acres In view of these contrasts, the variety of farming conditions contained within the county's borders can readily be envisaged. There are some exceedingly fertile soils in the lowlands, notably in the Eden Valley, along the Solway Plain and down the west coast. At the other end of the scale are the fell farms, too often with insufficient in-bye land. The hill farms usually have large acreages of open fell—the latter sometimes extremely bleak.

The soils are mainly of the transported type, and the effect of glacial action can often be seen in the lowlands, where boulders of granite trace the path of the glacier. The parent material from which these soils were derived is often difficult to recognize. Although their geological nature is known, little appears to have been recorded about their chemical properties. A soil survey of our lowlands and valleys would provide a wealth of valuable information.

Excluding rough grazing, the county's 6,500 holdings cover half a million acres—a little more than half the total area. Between a quarter and a third

of the county is rough grazing, or enclosed fell. The rest is open fell, where only the hardiest of hill sheep can exist and yet leave a profit for the farmer.

About a quarter of a million acres have been in arable production in recent years. The most common rotation, practised for generations, is oats-roots-oats, followed by a ley left down for a number of years. Crops for sale have no great significance, the farm economy revolving around the feeding of livestock. Oats occupy well over half the tillage area, and turnips (swedes) about one-quarter. When plenty of cheap feedingstuffs were available, corn and roots provided all that was necessary. Although excellent crops can be grown, the harvesting of them is another matter. The high rainfall makes the gathering of crops difficult and expensive.

Reputation for Cattle It is in stockmanship that the Cumberland farmer really excels. His eye for a beast is the product of hard training and long experience. The county's reputation as a reservoir for hard-wearing dairy replacements and store cattle stands high—enhanced further since the county, with Westmorland, became a major part of the North-Western Attested Area, the first area in England in which bovine tuberculosis has, for practical purposes, been eradicated. It is hardly surprising that such a livestock-conscious area should have been in the vanguard in this development. A further impetus was thus given to an already strong demand. Farmers in other areas come north in search of replacements for the reactors in their herds.

At one time the breeding herds were almost exclusively Shorthorn, and the Cumberland dual-purpose breeder stood supreme. When the demand was for more and more milk, other breeds and their crosses gradually became well entrenched. Although Cumberland still takes a pride in the many excellent herds of Shorthorns which remain in the county, the dairy heifers, third and fourth calvers and store cattle passing through many of the county's auction marts today are no longer predominantly Shorthorn. Fashions change; many may regret the cause, but the customer's needs must prevail.

Although Cumberland has always been regarded as a county primarily interested in livestock rearing, milk production was the life-line grasped by hill and lowland farmers alike during the period of depression. During the past fifteen years, production has gone up from 14 million gallons to 40 million gallons a year—with a high proportion of T.T. producers. Housing standards for milk production have also gone up appreciably during that time, and many new byres have been built. The old low-ceilinged byres, with hay lofts over, and thick stone walls, did not lend themselves readily to the necessary adaptations.

Sheep Sense Our lowland sheep flocks were largely depleted during the war and the sheep were then more or less confined to the hills. These breeding flocks suffered a severe setback during the winter of 1947, from which it took them five years to recover. In fact, sheep numbers are not yet back to their pre-war figure. It is important that the hill breeding flocks should be maintained. The place in our national economy of these hill nurseries, both cattle and sheep, is well recognized.

It is customary to let flocks of fell sheep with the farms. There is good reason for this, as hill sheep have a strong homing instinct and will travel miles to return to their native heath. They are known to graze within a short distance of the same spot throughout their lives. This enables the shepherd to draft ewes evenly from all parts of the fell and helps him to know every sheep in his flock individually.

Shortage of keep in the winter makes hogg wintering necessary. The economics of this long-established custom are exercising the minds of many flockmasters just now, since it now costs up to 30*s.* and more per head to send ewe hoggs away to winter on better pasturage. Before the war very good winterage could be had for 5*s.* per head.

The native breed of sheep, the Herdwick—originally "Hardwick"—is worthy of comment, although like our Shorthorn cattle its numbers have diminished. There are signs, however, that this downward trend has been checked. Other hill breeds have been preferred to the Herdwick on account of their greater prolificacy and better milking qualities. Can it be that they are not proving hardy enough for the more exposed hills? The Herdwick is the hardiest of all breeds and can survive the winter, even under the most severe conditions, without additional food. Local opinion has it that the Herdwick owes its origin to a number of Spanish sheep shipwrecked off the Cumberland coast at the time of the Spanish Armada. (It was, of course, customary in those days for live animals to be carried aboard as part of the ship's victuals.) The Herdwick has characteristics in common with native sheep found in Spain today, which would seem to lend some support to this interesting theory.*

Arrangements for selling both cattle and sheep are particularly well organized in the county. There are weekly markets for dairy cows, and the store cattle sales and autumn sheep sales are important events in the farming calendar.

Government assistance under the Hill Farming and Livestock Rearing Acts, together with livestock subsidies, are a means of ensuring that our hill farms can continue as economically sound units. There can be no doubt about the importance of such help in Cumberland. Much of the land suitable for rearing cannot compete in productivity at *any* price level with better land, and no system of farming can survive for long which allows no margin to accumulate capital for necessary improvements. Not only is such assistance necessary for individual farmers, it is vital for the industry as a whole if we are to have a well-balanced agriculture.

Of great importance in this connection are the improvements to farmhouses which these grants make possible. Without decent living conditions it will be difficult to hold, and even more difficult to attract, the all-important human element. The present-day requirements of the housewife are no less important than those of the menfolk.

Hiring farm workers for six months at a time is a custom which has long persisted in Cumberland. In the more remote areas the absence of alternative living accommodation has necessitated these workers living in the farmhouse with the farmer and his family—a practice which is not much in favour now, for domestic help for the farmer's wife is also hard to get.

Other Aspects A little more than 1,000 acres are in horticultural crops, very largely on three Land Settlement Association estates. The more kindly soils in the warmer regions, notably down the west coast, would appear to offer opportunities for horticultural development. Finding new markets, and competing with those already well established and keenly contested from outside, appear to be the greatest problems. The industrial developments in West Cumberland, with the swollen populations which they bring in their train, should increase the prospects for horticulture.

Cumberland is noted for good Clydesdale horses, although, as in other

* Another school of thought, however, holds that the breed was introduced by the Vikings.—*Editor*

counties, increasing mechanization has reduced their numbers, which now average less than one per holding.

Pigs and poultry, severely reduced in numbers as elsewhere during the period of food rationing, have both shown a remarkable recovery. Present populations are about 35,000 pigs and well over a million poultry.

There are about 120,000 acres of common land in the county, which in the present state of the law cannot easily be improved. Considerable research is needed into this problem, which does not seem to have changed much in the last 150 years. In their report to the Board of Agriculture in 1813, Bailey and Culley wrote: "The advantages that arise from enclosing, in respect to increase of value, almost entirely depend on the modes of management pursued after the enclosing takes place." Exactly how much common land is worth improving is not well understood, although enough information could no doubt be collated to enable an assessment to be made. Aside from legal matters, fencing is the biggest single problem.

Coal mining has always been important to Cumberland. Not until recently has this involved agriculture in any opencast problems. Plans are now being made, however, for extensive workings in West Cumberland. Much of the land at present being prospected is not of the best quality and this fact, together with the available extensive experience of other counties to draw upon, should mean fewer restoration difficulties than might otherwise have been the case.

Forestry is also a feature in the county. Approximately 40,000 acres are owned, or leased, by the Forestry Commission. Half this acreage is afforested, some of the earlier plantings being already half way to maturity. Included in the remainder are 7,000 acres of permanent agricultural land. The rest is bog or rock unsuitable for planting. There are also about 34,000 acres of privately owned woodlands in the county.

Land for planting was easier to obtain before the war when sheep farming was in a bad way. Much more serious thought is now being given to agricultural interests, and Forestry Commission proposals to acquire land for planting are discussed jointly with the Ministry of Agriculture in an effort to integrate as far as possible the needs of forestry and farming.

A Future in Grass So much for the present. What are the future prospects for farming in Cumberland? In such a geographical situation there are many respects in which its climate places Cumberland at a disadvantage, but in the present state of our farming economy the county also has resources available to few others. The county's strength—and its weakness—can lie in its grassland. In a mild and damp climate where grass grows so easily there is the danger that it is taken for granted, less attention being paid to its cultivation and management than would be considered necessary in more arid areas. Grass, well managed, available earlier and later, the surplus conserved as winter feed, would contribute much more to the economy of livestock feeding on many farms than at present. Indeed, it is mainly in the development of its grassland that the economic future of the county's farming lies.

Livestock and livestock products are the sources of over 80 per cent of the farmers' income. There is no doubt that stock numbers, already high, could be further increased. Cattle have reached the record figure of a quarter of a million. Sheep numbers have steadily regained lost ground and now stand at 611,000. Considered in relation to the area of useful land in the county, these figures even now represent a high stocking.

Linked with the better use of grass, the long-established practice of

relying on roots for winter feed is losing ground to kale and silage. The one-time custom of fattening sheep on turnips is fast dying out. Thus labour and feeding costs are together exerting a pressure which is inducing changes in a system established for generations. Firm believers in the value of roots are exploring the possibilities of mechanizing the growing of the crop—by no means a simple matter under northern conditions—for the high cost of growing roots must be cut.

Silage or roots? They compete for a place in the farming system. Resistance to change has slowed down the rate at which silage-making has advanced in the county, because silage has to be made at the same time that roots have to be singled, and time cannot be found for both. It may be significant that Bailey and Culley wrote in 1813 that only a few farmers seemed at that time to appreciate the value of turnips! In view of the "tardiness of farmers to adopt new ideas", they did not consider this surprising.

Cumberland will continue to be an important livestock rearing county, although during the lean years milk alone made it possible for many farmers to keep going. With the emphasis now on beef, it is hoped that more farmers will see a better future in meeting the demand for beef stores. The future for pigs and poultry is bound up with more economical production, with the emphasis on quality and consumer demand.

There are exceptional opportunities in Cumberland for an increase in self-sufficiency, which fits in so well with the economy of the average Cumberland farm. Today there is a nation-wide call for keen, critical economic appraisal of the farm unit as a whole. With their instinctive ability for critical appraisal of livestock, Cumberland farmers should find it easier to appreciate and respond to this call, so necessary if the future is to be faced with confidence.

FORTHCOMING AGRICULTURAL SHOWS

Date	Show	Location
July 10-12	**Great Yorkshire**	Harrogate.
11-12	**Kent**	Mote Park, Maidstone.
13-14	**Bedfordshire**	Cardington.
17-19	**Peterborough**	Eastfield, Peterborough.
18-19	**Sussex**	Hassocks.
19	**Bridgwater**	Huntworth Gate, Bridgwater.
19	**Cumberland**	Bitts Park, Carlisle.
19	**Isle of Wight (Royal)**	Standen Fields, Blackwater, Newport.
19	**Liverpool**	Wavertree, Liverpool.
20-21	**Staffordshire**	Uttoxeter.
25-27	**Royal Welsh**	Rhyl.
31-*Aug.* 3	**Royal Lancashire**	Blackpool.
Aug. 3-4	**Durham**	Chester-le-Street.
6	**Rutland**	Oakham.

These dates are subject to revision or even cancellation.

A SUCKLER HERD IN NORTHUMBERLAND

R. ROBINSON
Snipe House, Alnwick
and
J. B. KERR, B.Sc.
Assistant County Agricultural Officer, Northumberland

Snipe House, a 2,200 acre upland farm near Alnwick, is fairly typical of the many holdings in the county on which beef calves are raised by the single-suckling system for sale to the feeder.

THE single-suckling system of producing beef stores has long been practised in many parts of Northumberland, especially on the poorer land to the west, but in the last ten years or so it has become much more widespread. Mostly it has increased in the marginal areas, but in a few instances it is even to be found on good feeding land. This enhanced interest in the system has been due largely to the relative scarcity and the consequent high prices of bought-in stores, plus the incentive offered by the Hill Cow and Calf Subsidies. It is worthy of note that Northumberland imports some 60,000 Irish stores every year.

In these days of intensive farming, the view has often been expressed that the one-cow-one-calf system is extravagant in its use of land, and that some more intensive method, such as multiple suckling, would be better both in the national interest and from the point of view of farm profit. There are sound reasons, however, for the continuance of the system in Northumberland. One is that the farms, generally speaking, are large, and that labour, rather than land, is the limiting factor. On smaller farms single suckling certainly does not provide a sufficient turn-over. A second reason is that on many of these marginal holdings housing accommodation for stock is extremely limited. Selling the calves off their mothers in the autumn and wintering the cows outside overcomes this difficulty. There is also no better animal than the suckler cow for making use of the rough herbage, and, not least, there is no better way of rearing a good beef calf than by allowing the mother to suckle it. If properly handled by the feeder, these calves can be ready for the butcher fully a year earlier than most pail-fed calves—a point of great importance these days. Current sale prices show that buyers are well aware of this fact, especially when good conformation is linked with early maturity.

One or two Northumberland farmers are trying to rear two calves per cow, but it is questionable whether this is likely to be popular in the foreseeable future, again because of the labour difficulties, the scarcity and cost of suitable calves, and the fact that it involves the provision of more and better quality winter keep than is generally available.

During the last few years, with the return to free marketing and the emphasis on quality, there has been a swing back on most Northumberland farms to the Irish Aberdeen-Angus × Shorthorn cow, so popular before the war, as the basis of the herd. The exceptions are to be found on the higher and wetter land in the south-west of the county, where Galloways and some Highland crosses still predominate. The Hereford cow, though she produces early-maturing calves, has lost ground, because she takes second place in quality, requires rather more wintering, and, possibly, does not wear so long. The Irish Aberdeen-Angus cross is hardy, quiet, usually a good milker, and naturally polled; replacements which pass the tuberculin test well can be

obtained in level lots. In general, she is mated to an Aberdeen-Angus bull. Calves by this sire are the most saleable and, compared with the Hereford, they are not so heavy on the cow. Apart from breed, however, particular emphasis is laid by rearers on getting stock of the right type; length and depth are particularly important.

Snipe House Turning from the general to the particular, it is interesting to look at one typical rearing farm where the single-suckling system is practised. Snipe House, a farm of 2,200 acres, lies four miles south of Alnwick to the west of the Great North Road. Most of the land is strong clay. The farm carries 300 Aberdeen-Angus cross cows and 1,300 blackfaced ewes producing Mule (Border Leicester × blackfaced) lambs. The whole of the holding is in grass, half of it being in-bye land and half hill land, which rises from 500 to 900 feet. To date, 360 acres of the hill have been reseeded, practically all of it direct. The method has been to use a single-furrow plough, and to follow this by heavy liming (magnesium limestone is favoured now to reduce the risk of hypomagnesaemia), generous treatment with compound fertilizer, and slag at seeding time. Subsequently, slag dressings are given every four years at the rate of 10 cwt per acre.

Every year 40-50 two- and four-toothed West of Ireland heifers are bought in as replacements during February and March. The aim is to get animals with plenty of substance without being too much on the leg. They are put through the tuberculin test and inoculated immediately with S.19 vaccine against abortion. This inoculation puts them off colour for about a week, but it is well worth while. The cows and heifers are put to the bull at the beginning of April at the rate of 30-40 per bull. Particular stress is put on early calving and on a concentrated calving period. The ideal aimed at is to have as many as possible calving about mid-February, but to get the calving over by, say, the end of March, it is necessary to start rather earlier in February. The disadvantage of too early calving is that the calves tend to go "stirky" before sale time and lose quality and bloom through lack of milk, but, on the other hand, the late calf does not cope too well with the flush of milk from the spring grass and is worth less in the autumn.

The calving percentage is usually in the region of 90-95. Rather than buy calves for setting on, the practice is to shed a few of the poorer milkers during the autumn for early calving and to use their calves as required for setting on to any of the better cows which may have lost a calf. The discarded mothers are fattened during the summer and sold as cow beef.

The type of bull sought is one with plenty of scale without being long on the leg, a level tail head and a good broad muzzle. Good bulls cost a lot these days, but bearing in mind that each can be expected to sire some 200 calves, a difference in price of £100 means only 10*s*. per calf. Bulls leaving calves with mossy coats are particularly valuable. Each bull, with his females, is put into a separate field and is changed round at three-weekly intervals.

Disposal of Calves After calving, the heifer calves are separated from the bullocks and are kept apart until they are sold. This sorting process goes on throughout the grazing period so as to obtain level lots and to minimize labour demands and disturbance of the animals when preparing for the sale. The bull calves are castrated with the knife at 4-6 weeks old, the idea here being to allow them to get a certain amount of "strength" about the head and tail without getting too coarse. During the summer the cows and calves are run on the better land, and it is considered good practice to remove sheep entirely from the cattle pastures during the

last six weeks before sale. The calves receive no supplementary feed of any kind.

The calves are sold at the big Border sales held in October, the chief centres being Reston and St. Boswells, Hawick, Stirling and Wooler. Buyers attend from all over Britain, and prices during the last few years have been remarkably good. The average price of the Snipe House calves last year, taking bullocks and heifers together, was £44 15*s*. Usually the heifer weighs about 1 cwt less than the bullock and sells for about £10 less. The practice is to sell in even lots of ten to twenty.

Care of the Nurse Cow The cows lie out all winter on the rougher land. Getting even a small bite of grass outside keeps them fresher and fitter than they would be if housed. Incidentally, care is necessary when carrying out a large-scale programme of reseeding not to cut down too much on the acreage of rough ground for wintering purposes. Hand-feeding usually starts in mid-December, when the cows are given hay. Hay feeding continues for about four months, the average daily ration being about 10 lb per head. After the turn of the year, grass silage is added at the rate of ½ cwt per head per day. In stormy weather a certain amount of straw is put out, but more from the point of view of giving the calves a dry lie than of providing feed.

Disease troubles are relatively few, but when they do crop up they can be serious, for one dead cow means the loss of £60-70, not to mention the decreased value of the calf. Vaccination has practically eliminated abortion, and mastitis occurs only very infrequently, but white scour is something which seems to crop up now and again for no apparent reason. The treatment is to dose with an oral solution of streptomycin sulphate.

Another disorder which reared its head for the first time on any scale in the early spring of 1954, is hypomagnesaemia. It has not been so troublesome since then, but preventive measures are taken so far as present knowledge allows. It is not a very practical proposition when dealing with big numbers to hand-feed, and experience has been that cows will not eat sufficient of a straight mineral mixture. Even if they would, it would be difficult to ensure by this method that each has its full share. Accordingly, the minerals (high in magnesium) are sprinkled over the silage as it is put on to the trailers.

Low Profit Margins It is a matter of simple arithmetic (which feeders seem to enjoy) to add together the Hill Cow and Calf Subsidies and the Attestation Bonus, multiply by the number of cows, and quote the resulting fortune which is going into the hands of breeders of suckler calves. The breeder, on the other hand, finds it equally simple, though less pleasant, to reckon up the cost of replacement heifers, Perth bulls and winter keep. Allowing for the price of the culled cow, each replacement now costs £25-30, and a good bull anything from £400 to £500. The cost of winter feed alone is probably at least £12 per cow, and to these expenses must be added rent grazing, labour, veterinary bills, management and overheads. It can easily be seen that the breeder has no mean task to keep his head above water. Indeed, listening to some breeders the onlooker could be forgiven for forming the impression that the breeder is often inspired by purely altruistic and patriotic motives in supplying the feeder on the rich lowland pastures with first-class raw material! Feeder acquaintances may regard this as something of a "bull" story, but it is a fact that the breeder has frequently to be content with a small return per calf and a lot of satisfaction, rather than huge profits and a life of ease.

THE DUKE OF NORTHUMBERLAND'S ESTATES

J. R. Booth, M.C., Q.A.L.A.S.
Agricultural Land Service, Northern Province

Centred on ancient Alnwick Castle, the 98,000 acres of the Duke of Northumberland's estates provide an outstanding example of how wise management through the years has laid the foundation for the sound, business-like organization that exists today.

THESE estates have been in the hands of the Percy family for so long that, in describing them, any writer must be sorely tempted to devote a good deal of his space to the colourful history of the area. For throughout many centuries, when the people of Northumberland had to face intermittent and savage Border affrays, this great family was renowned for its fighting men. At that time, Alnwick was a walled town and the Castle an imposing fortress. But in the more peaceful years of the early seventeenth century the estates were in the possession of the 9th Earl of Northumberland (1564-1632), a man of outstanding organizing ability, and it was he who laid the foundations of a system of estate management which has been carried on to the present time. Amongst other things, the 9th Earl made the first comprehensive survey of the estates, which was completed with maps in 1624 and is still in an excellent state of preservation. This first survey, together with subsequent ones, makes it possible to trace the history of a great many present-day tenancies.

It was during his sixteen years in the Tower, while the Crown lawyers sought in vain to implicate him in the Gunpowder Plot of 1605, that the 9th Earl received the greatest help from Thomas Hariot, a distinguished mathematician, in the administration of the estates. Hariot, who had been introduced to the 9th Earl by Raleigh, was surveyor to Grenville's expedition to Virginia in 1585, and on his return he wrote an account of the economic possibilities of the colony which attracted wide attention at that time. Having for some time been in receipt of a pension from the 9th Earl, he was given residence at Syon House, Brentford, in 1607, and it was then that he began the comprehensive system of accounting which has been developed through the years.

In 1766 a Dukedom was conferred on Sir Hugh Smithson, who had taken the name and arms of Percy when he married Lady Elizabeth Seymour, the heiress and his distant kinswoman. He soon made his considerable personality felt on the estates: under his administration the rentals grew from about £8,600 in 1749 when he was married, to over £25,000 in 1765, and by 1778 had increased to £50,000. That this was the result of wise management is obvious from the records of the family: "However, the strong attachment frequently displayed towards the Percy heiress and her husband by their tenantry affords the best proof that the rise in the value of their property was not effected at the cost of the prosperity or comfort of their dependants."

The first Duke spent large sums on improvement schemes for the farms and woodlands and made a major restoration at Alnwick Castle, which had been little altered since it was built in 1100. Both Robert Adam and "Capability" Brown were engaged on this restoration work.

The fourth Duke carried on the work of improvement during the middle of the nineteenth century, with extensive land drainage and afforestation

schemes and by renovating and rebuilding the farm steadings and cottages. He engaged Salvin, the eminent architect, to carry out large-scale alterations in the Castle. Today, the work of maintenance and modernization is still being continued by the present Duke, who is 10th in line. He succeeded to the title when his elder brother was killed in France in 1940 whilst serving with the Grenadier Guards.

The estate records have always been kept in great detail, and many of the older ones are in such a fine state of preservation that it is possible to find much interesting, and sometimes amusing, information about past tenancies and rentals. Thus the 6th Earl was said to have locked an unfortunate auditor named Worme in the Castle, following a rent audit, until he balanced the books to the satisfaction of his employer. That room is known today as the Auditor's Tower.

Management The total area of the estates was probably at its largest shortly after the First World War, when there were about 180,000 acres. But even today, with an area of approximately 98,000 acres, the property must be one of the largest still in private ownership. There are 3,500 separate tenancies of all types, ranging from the small garden worth a few shillings a year to the other extreme of very large farms, and including 207 agricultural holdings of over 50 acres.

It is interesting to examine the organization which manages such a large property. The centre of activities is, of course, the estate office at Alnwick Castle, which is under the control of the Head Agent, Mr. A. Beresford Pierse, M.B.E., F.L.A.S. The estates have been divided broadly into two sections which, for the purposes of this article, may be termed the Tyneside and the Northern sections. The first of these covers property from Tynemouth through the industrial belt in the south of the county and along the River North Tyne up to Bellingham. The management of this part is carried out by a prominent firm of land agents in general practice, who operate from the Duke's estate office in Newcastle. The Northern section is managed from the Alnwick office, where the Head Agent has the help of a sub-agent.

The Clerk of Works department serves both sections of the property, but the maintenance staff is small and its activities are confined almost entirely to local work. Building work on the farms is carried out by contractors under the supervision of the Clerk of Works and frequently in accordance with plans and specifications prepared in his department.

There are three other departments operating under the Head Agent, dealing with accountancy, surveying, and forestry matters. The Surveyor is responsible for all sales and purchases, leases other than farm tenancies, and the maintenance of the very important estate records. In these days of high taxation, the work of the Cashier's department is of paramount importance. A staff of five are kept fully engaged in the preparation of all the estate accounts, including those required in connection with property and mineral rents, woodlands, farms in hand and the Duke's household. All income tax and surtax matters are handled by this department. In all, nearly 200 persons are employed regularly on these estates.

Farms in Hand The Duke himself farms four holdings, two of them hill farms and two of them in the lowland areas, having a total area of 12,622 acres. All are controlled by one farm manager, but are run quite separately with their own accounts. There are, of course, transfers of stock and services from one farm to the other, but these are all charged out at proper rates, so that it is possible to have accurate information as to the financial success of each farm.

Emblehope is the largest of the Duke's farms, covering 7,536 acres. It lies in a remote area of the Cheviot hills and runs up to 1,600 feet above sea level. Here the usual stocking consists of 2,400 Scotch Blackface ewes breeding pure-bred lambs, together with 640 ewe hoggs wintered on the farm and kept to replace the draft ewes. In addition, there is a suckler herd of 40 cows, consisting mainly of Galloway and Kyloe crosses run with the Shorthorn bull. The calves cannot be wintered on the farm and, at one time, were sold in the autumn suckler calf sales. Now they are transferred to the lowland farms, whence they can be sold off fat.

The second hill farm, Lordenshaws, covers 3,275 acres at a rather lower altitude than Emblehope—the land lying between 600 and 1,100 feet above sea level. The land is, however, of a poorer quality and carries 700 Scotch Blackface ewes and 200 ewe hoggs.

The larger of the lower farms, of some 1,460 acres, is situated in the Parks at Alnwick. The Parks themselves are a very pleasant feature of the estate, covering about 3,000 acres, but are well wooded, so that rather less than half this area can be used for farming. The presence of so much woodland presents problems of management for the farm, but, even so, 100 acres are kept in arable crops and a similar area cut for hay each year. Running on this farm are 90 Cheviot ewes, breeding Halfbred lambs, and 200 Halfbred ewes. The cattle comprise a small herd of attested Guernsey cows to supply milk for the Castle and estates staff, and about 20 attested pedigree beef Shorthorns kept to breed stock bulls for crossing purposes. In addition, some 50 Irish heifers are bought each year for outwintering to be fattened off the grass at the other lowland farm.

The fourth farm at Rennington was taken in hand in 1950 and extends to 350 acres. Nearly all the land is ploughable; some 120 acres are in crop and about 40 acres are cut for hay. Eighty Halfbred ewes are crossed with an Oxford tup and the lambs sold off fat. Some 120 Irish heifers are fattened each year.

Tenant Farms As already mentioned, there are 207 farms of more than 50 acres each, of which 61 fall within the 200-300 acre class. There are 54 farms extending to more than 400 acres, and only 19 of less than 100 acres. On the whole, therefore, it is an estate of large farms, although many of them lie in hill districts and include a considerable area of rough grazing.

The Duke was one of the first landowners in the county to appreciate the advantages to both owners and tenants of the grants available under the Hill Farming and Livestock Rearing Acts, and 41 comprehensive improvement schemes have been accepted by the Ministry for grant-aid. These schemes cover nearly all the farms on the estates which are eligible for this type of assistance, and a considerable amount of money has been spent on them. Priority is given throughout the estates to the improvement of farmhouses and cottages, and good progress has been made in providing essential modern facilities. Expenditure on improvements has been heavy, and it should be mentioned that there have been two general reviews of rents on the estates in the last ten years.

Generally all maintenance and improvement works on these farms is done by private building contractors, and the reader may wonder why the estates maintenance staff cannot be increased to do a lot of this work. The answer is that because the estates are spread over such a wide area, the cost of transporting estates' staff and materials and of the detailed supervision that would be required are likely to outweigh the value of any advantages that would

arise from it. Shortage of contractors has not delayed progress on improvements and maintenance work.

Woodlands The present Duke takes a great personal interest in afforestation, and on several occasions has spoken publicly on the benefits to be obtained by a proper integration of forestry with agriculture. He has on the estates at the present time 5,349 acres of woodlands, which are all dedicated under the Forestry Commission's Dedication Scheme. The woods are generally far from maturity. Of the area planted so far, 1,923 acres are under twenty years old, and a further 873 acres are not more than fifty years old. The older trees are mainly hardwoods and cover an area of 1,543 acres, leaving a balance of just over 1,000 acres to be planted. The forest nursery, which was formerly the flower garden, is of particular interest. It supplies all the young trees required for a planting programme of roughly 150 acres a year. Over 1,000 acres were felled during the Second World War, but in the last ten years 1,426 acres have been planted, 800 acres thinned and 270 acres felled.

The woodlands are divided into thirteen districts, each with its own plan of operations, and a permanent staff of 70 men is employed in the woods under the direction of the Head Forester.

The large area of planting carried out is now leading to a considerable amount of work on thinning these new plantations, and in some areas it has been necessary to engage outside contractors to help. There are two estate sawmills which supply most of the timber required for fencing and building maintenance, as well as a quantity of pit timber for sale.

Sporting Any sporting rights on the estate are mainly let to the farm tenants, but the Duke shoots in the Parks, where some pheasants are reared, and on the adjoining farms—a total area of approximately 3,500 acres. The Duke is also Master of the Percy Foxhounds, which hunt the country bordered on the south by the River Coquet and on the west by the moors. It includes the fine feeding pastures on the east coast.

Fishing rights on the Rivers Coquet, Aln and Till are let to local fishing clubs, with the exception of part of the Aln running through the Parks.

So rich in history, so varied in character, and so extensive are the Duke's estates in Northumberland that it is virtually impossible to do them anything like full justice in the narrow confines of this article. However, I hope that sufficient has been written to point the efficiency and modern outlook of the present organization. There are few larger private estates in this country, and certainly none more imaginatively managed.

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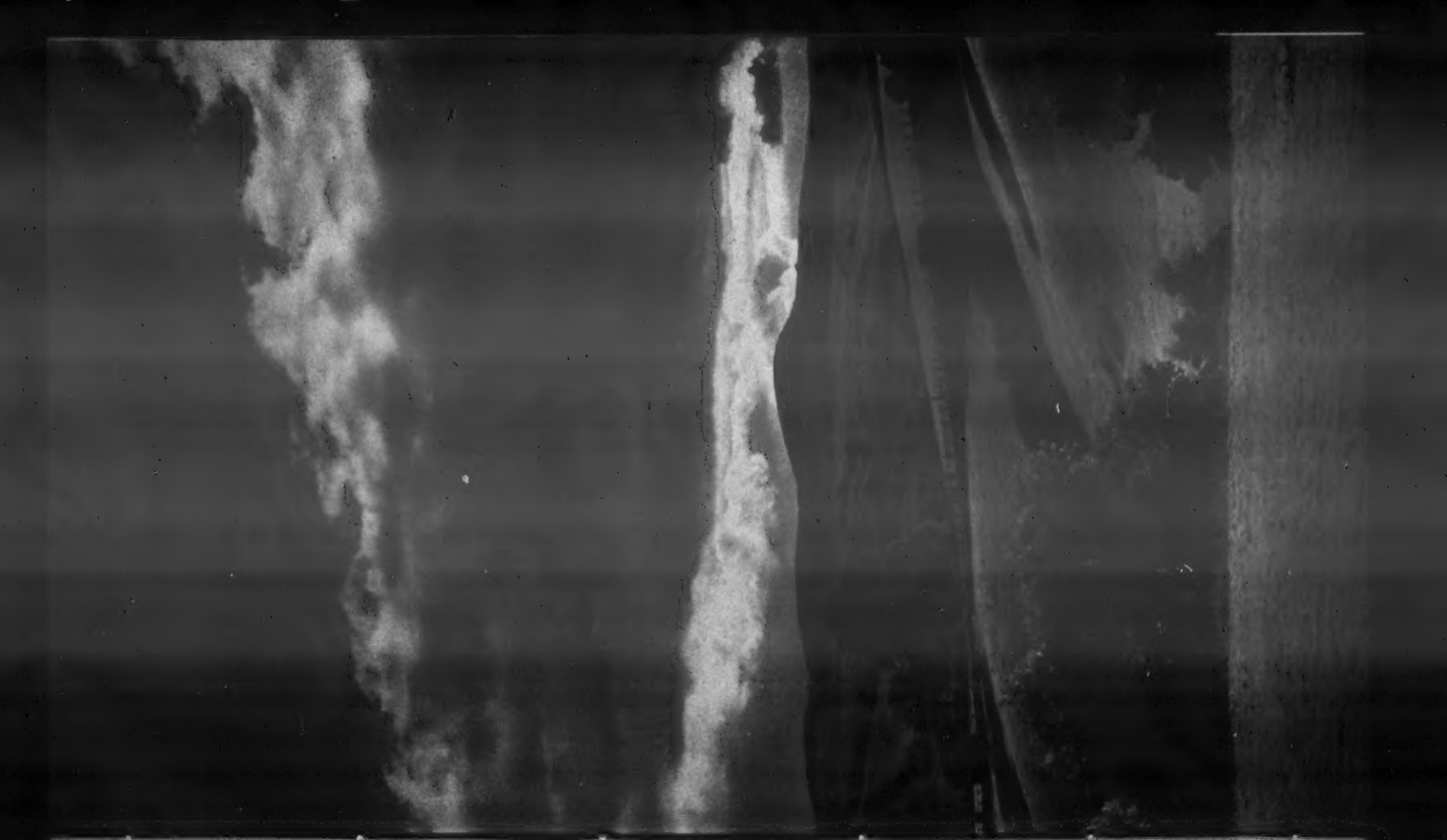
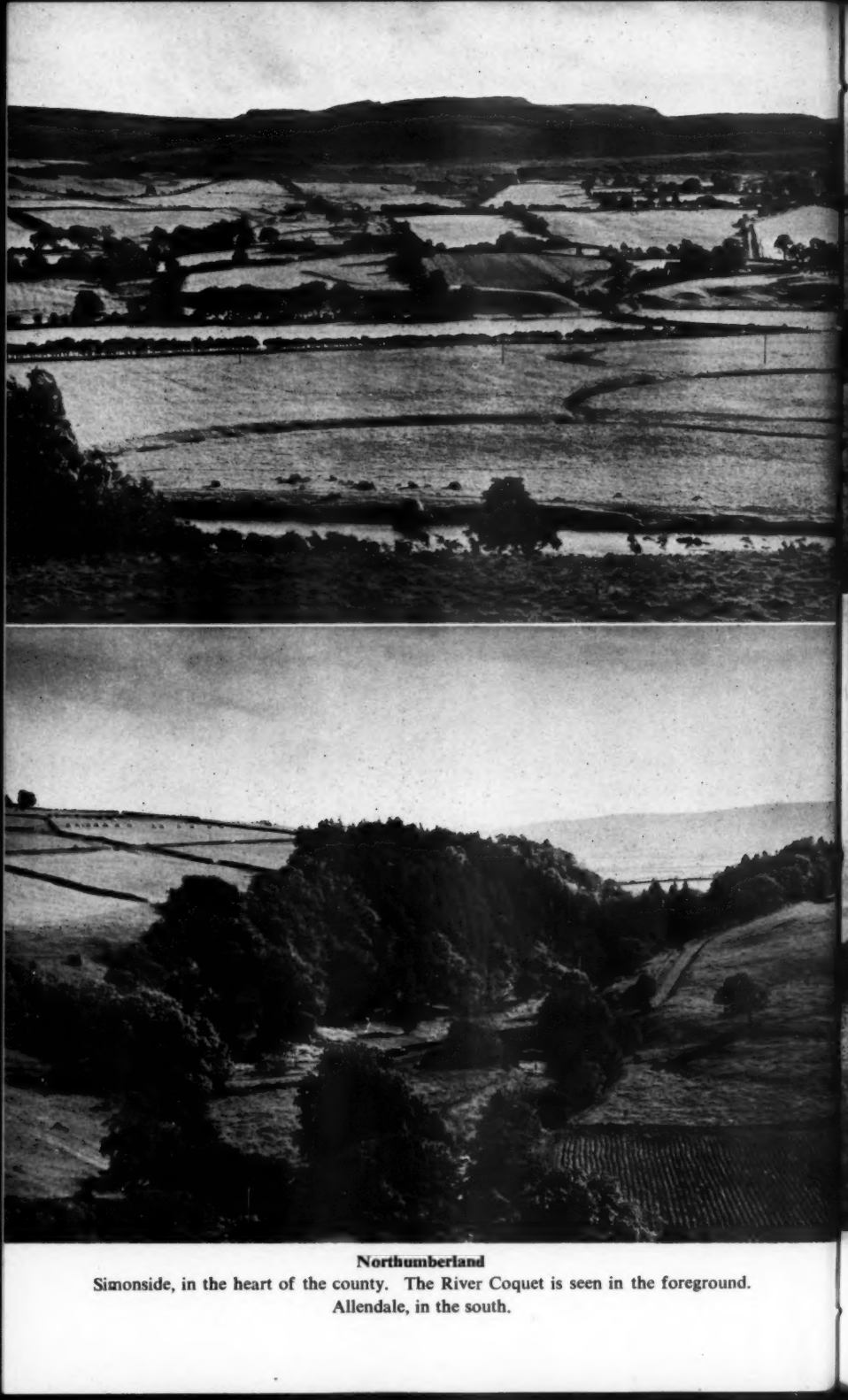
Rothbury, Northumberland





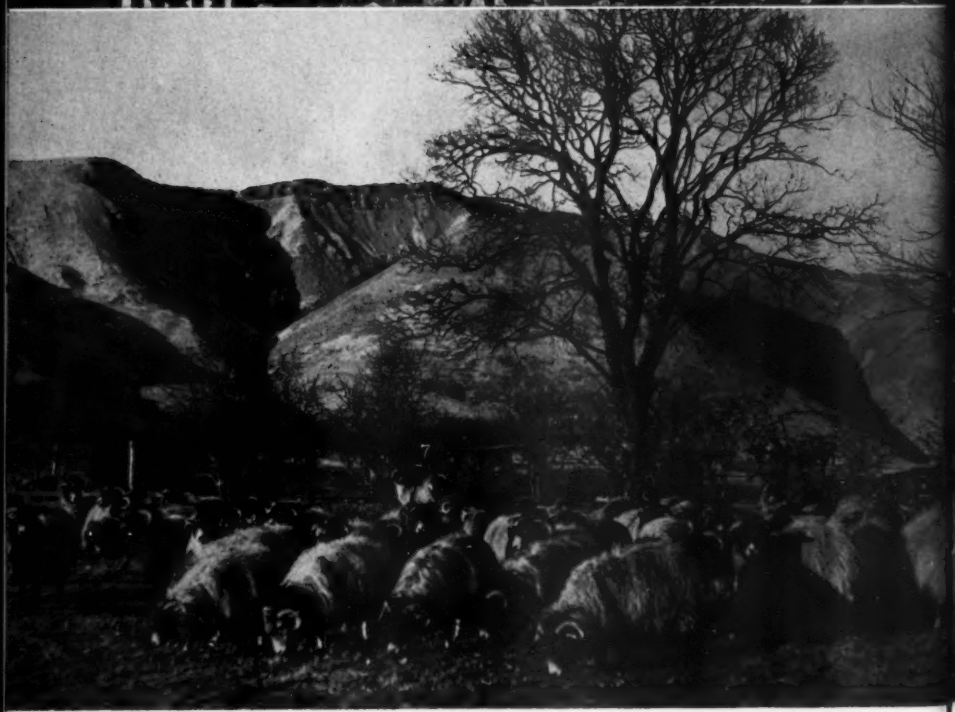
Northumberland

Simonside, in the heart of the county. The River Coquet is seen in the foreground.
Allendale, in the south.

Northumberland

Suckler herd, Snipe House. (*Article on pp.* 166-8).

The Wild White Cattle in Chillingham Park (*Article on pp.* 176-9). The king bull can be seen second from the left.



Cumberland

Vale of St. John, near Keswick.

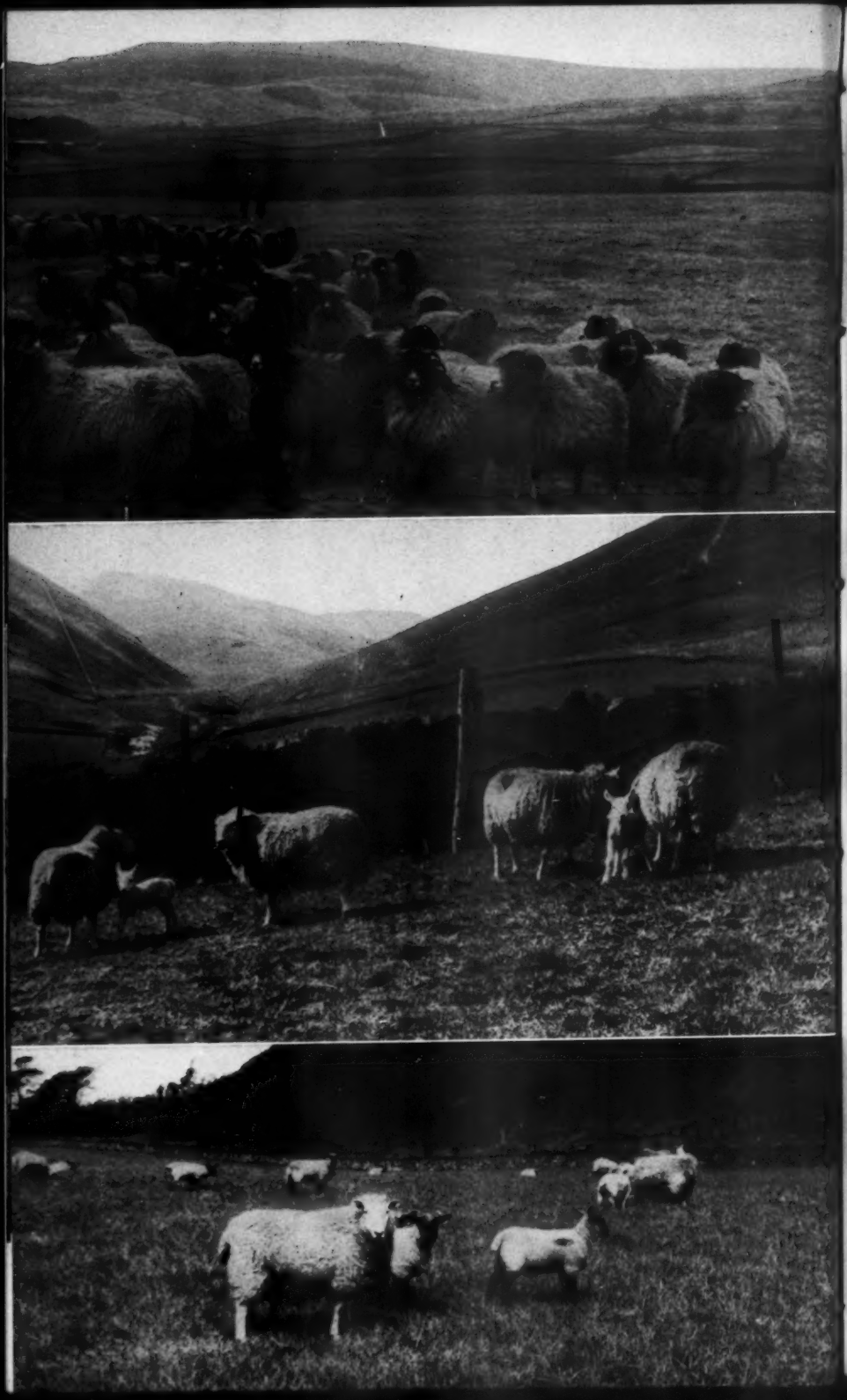
Swaledales at the foot of Saddleback, Thekald.

Cumberland

Rosthwaite Valley, with Skiddaw in the background.
Looking over Caldbeck towards the Solway.

King's College, Newcastle upon Tyne, and Cockle Park.
(*Article on pp.* 183-6)

The Duke of Northumberland's Estates (*Article on pp.* 169-72)
Forestry nursery at Alnwick Castle.
New cottages at Alnham.
New road and bridge on Emblehope Farm.



SHEEP CROSSES IN NORTH-EAST ENGLAND

LESLIE Y. DENT and M. McG. COOPER, B.AGR.SC.(N.Z.), DIP.RUR.ECON., B.LITT.

Sheep are a major enterprise on the uplands of the North-East. And, as Professor Cooper and Mr. Dent, a well-known local farmer and auctioneer, point out, there is sound common sense and a wealth of experience behind the three-way crossing adopted to produce the prime lowland fat lamb.

THE North-East is fortunate in the ready availability of ewes suitable for fat lamb production and the proximity of breeding areas on the uplands to the better land where fat lambs are reared. This not only reduces transport costs to a minimum but confers the additional important advantage that farmers know the source of their ewes and can establish a reliable connection, which they maintain year after year. In both these respects they have a marked pull over farmers who have to buy from a distance. The north-eastern farmer has another asset in that he operates in a solid sheep-producing area, where the arts and skills of shepherding are well appreciated. The consequence is that most farmers are very discriminating in choosing sheep for their suitability for local conditions. Sheep are in no sense a casual sideline of farming. They have a standing which is not matched anywhere else in Britain, except perhaps in the marches of Wales and in Kent.

The First Cross In the stratification pattern there are three main breeds at the top level—namely, the Scotch Blackface, the Swaledale and the Cheviot. It is not for us to argue the respective merits of the Blackface and the Swaledale, for each breed has plenty of supporters, beyond saying that the latter breed has not suffered from fashions and very high prices for tups. It is essentially a farmer's sheep for hard upland conditions, but this applies also to the great majority of Blackface flocks, where a due sense of realism has been preserved. A mountain sheep's prime virtue is one of being able to thrive and reproduce under very difficult conditions, and a hill farmer just cannot survive unless his sheep have these qualities. The high hill is a stern master and a ruthless culler of the unfit. This is very fortunate for lowland farmers, for it means that eventually they receive animals which are endowed with a capacity to live on fairly short commons in the winter and to milk well when grass is plentiful.

When they have worked their stint on the hill and move to lower ground, the mountain breeds are seldom used directly for fat lamb production with Down sires. Invariably there is a further stage in stratification by the use of a Leicester-type ram to produce first crosses, in which the ewes are remarkable for their fecundity, milking qualities and mothering instincts. The

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Fat Lambs from the Hills

(*top*) The Swaledale is well suited to the hard, upland conditions.

(*centre*) Cheviot ewes with lambs. Crossed with a Border Leicester, they give the popular Scotch Halfbred.

(*bottom*) Mated with a Down breed, such as the Oxford, the Scotch Halfbred ewe produces first quality lambs for fattening on the lowlands.

Scotch Halfbred (Border Leicester × Cheviot) and the various types of Mule ewe, which are given the general term of Greyfaces, are of outstanding quality as mothers for fat lamb production. Three distinct methods of producing Mule ewes are followed. The Blue-faced or Hexham Leicester may be crossed either with the Swaledale or the Scotch Blackface, or the Border Leicester may be used on the Scotch Blackface ewe. This last cross is more popular in Scotland than in the north of England, which prefers the Hexham Leicester cross. The Border cross carries rather more wool, is inclined to be rather fatter, and has a very much lighter coloured face. The latter, of course, is no great drawback, but it does constitute something of a "trade-mark".

Whatever one's loyalties may be, few will question the view that the Scotch Halfbred is the outstanding fat lamb mother on really good land. Even in quite large flocks, if they are properly handled at tupping and lambing time, it is reasonable to expect 160 lambs reared for every 100 ewes mated. Moreover, there will be surprisingly little difference between the few singles and the twins at weaning time, provided feeding and management are sound—a testimony to the milking qualities of these ewes. It is stressed that good conditions must be provided if these ewes are to give of their best, especially if they are derived from the larger North Country Cheviot, as opposed to the neater South Country sheep, which is the product of harder conditions.

Very wisely, the Mule ewe, which is equally fecund and is just as productive, is more favoured on fat lamb farms, where it is not considered economic to provide really good grazing and heavy supplementary feeding. The superiority of the Mule under such conditions, combined with the lower price one has to pay for it as compared with the Halfbred, is a very real advantage which offsets to a considerable degree the greater apparent variability of the lambs resulting from any of the Down crosses on the Mule. This variability is largely due to differences in the character of the fleece. Some lambs will tend to have highly medulated, open wool and others will have more of the Down character, whereas lambs derived from Halfbreds will have greater evenness and density of fleece.

This variation is of most consequence when lambs are sold on the hoof, for they look a little rougher than their Halfbred counterparts, but sold on the hook they are commendably uniform.

One outstanding feature of both the Mule and the Halfbred for fat lamb production is the vigour of their lambs at birth. They are very quickly on their feet suckling, and when only a day old they display an activity which is seldom encountered in lambs from the Clun or the Romney. This is an important consideration when hard conditions prevail at lambing. Possibly their mountain ancestry is largely responsible for this quality.

Mating with Down Breeds Fashions in breeds of rams for use on these first cross ewes have been changing over the past two years now that the so-called "consumers' preference" is being exercised. Formerly, the Oxford Down was very popular, and there is no question that this cross often gives a very good weight-for-age performance. The lambs must be managed very well and, in modern conditions, must be marketed milk fat. If they lose their suckling bloom it is very difficult to restore condition until virtually the hogget stage has been reached, when the carcasses are too large for the present trade.

Farmers in the north have not swung, as southern sheep farmers have, to the extreme of using the Southdown or the Dorset Down to produce a really high quality light lamb similar to that which New Zealand exports. Instead,

the emphasis has moved to the Suffolk, which seems to give a happy compromise between quality and quantity. Given good ewes, either Mules or Halfbreds, and a sensible management of grassland, the great majority of these Suffolk cross lambs can be marketed at weights ranging from 38 to 45 lb at about 16 weeks old. They are of good quality and meet a ready demand from the trade.

The Hampshire ram also has its advocates because of the early maturity of the lambs, but, because of its broad head, most farmers are not inclined to use this breed on maiden ewes or on ewe lambs which are bred from in their first year—not an uncommon practice with well-grown Halfbred lambs. When the Hampshire ram is mated with older ewes, lambing difficulties are not noticeably aggravated and a very useful blocky lamb results. The Hampshire appears to put a mark of evenness on his progeny. Possibly it is the very dominant type of head with its characteristic markings and pitch of the ears that is responsible, but some of us have a feeling that Hampshire cross lambs conform more to a type than the lambs sired by other breeds, notably the Oxford. Certainly there is more uniformity in the fleece, and this is important when rough-woolled ewes are used.

The modern trend with all these crosses is one of drafting lambs fat off their mothers. To get the best prices it is important to sell early, either in May or June, before the great bulk of the lamb crop comes on the market. Here the milking qualities of the cross-bred ewe are supremely important, as are the early maturing attributes of the Down ram. Equally important, however, is the ewe's capacity to come to the ram early in the autumn, preferably before the middle of September. In this respect the Mule does not appear to be quite as good as the Halfbred, which, in turn, seems to be later than ewes with Down blood in them. There may be some justification, therefore, for retaining Suffolk or Oxford cross ewe lambs for entry into the breeding flock for early lamb production. Because they mature quickly they can be bred from in their first year and they retain a high degree of prolificacy.

The Masham This article would not be complete without some reference to the Masham ewe, which is very popular in the northern parts of Yorkshire and South Durham. Either the Teeswater or the Wensleydale may be used on the Swaledale ewe, but the relative merits of the two crosses have not yet been defined beyond the point of hotly contested personal opinions. The Masham has a rather coarser wool than the Mule, the staple is rather flatter and the fleece tends to be rather open. It is, however, a most valuable fat lamb mother, with well-recognized milking qualities. Its lambs by Down rams are well fleshed and provide good cutting carcasses, which are not inclined to over-fatness.

Sheep Experts The North-East is indeed fortunate in the breeding ewes it has at its disposal, and it seems highly unlikely that it will have recourse to any of the "self-contained" breeds, such as the Clun, which is becoming so popular further south. The proximity of the uplands, with its reservoir of breeding stock, makes this unnecessary, and the dominant fleshing qualities of the Down rams used in the final cross successfully cover up any deficiencies which the cross-bred ewes may carry in respect of carcass conformation. Behind this there is a very deep knowledge of sheep and shepherding on the part of farmers and farm workers. There is real discrimination when sheep are bought, and undoubtedly this has contributed to the quality of sheep stock which is so obvious on farms north of the Humber.

THE WILD WHITE CATTLE OF CHILLINGHAM

THE EARL OF TANKERVILLE, F.Z.S.

Of the five herds of horned white cattle which remain in Britain today, only the Chillingham herd can claim to have the purest surviving members of the wild white cattle which formerly roamed the forests of north Britain.

DURING the past few years the herd of wild white cattle at Chillingham in north Northumberland has been receiving increasing attention, both from the press and from various scientific bodies. This is probably due in no small measure to the fact that the severe winter of February-March 1947 decimated the herd and threatened its extinction. The intensive inbreeding which has since taken place has aroused the greatest interest among scientists and animal geneticists; for the mating and breeding of these cattle is left entirely to nature, and the results may quite possibly prove of value to breeders of domestic cattle.

Origin in Obscurity The origin of the Chillingham wild cattle is obscure. They are thought to be descendants of the ancient aurochs which roamed northern Europe in pre-historic times. The aurochs, however, was supposed to be a dark animal, the bulls being nearly black but with a white dorsal stripe. It is possible that the Druids, by some process of segregation and selective slaughter, may have managed eventually to produce a white animal, for white animals were prized by them for sacrificial purposes. Be that as it may, the present Chillingham wild cattle breed is unvaryingly true to type, and no coloured or even partly-coloured calf is ever born amongst them. They are not albinos, however, for they have dark eyes, black muzzles and hoofs, fox-red hair inside the ears, and the horns, when fully developed, usually have black tips.

In bygone days, herds of wild cattle probably roamed the great border forests which stretched from Chillingham westward to the Clyde estuary. Their movement would no doubt be seasonal, according to grazing conditions. It is thought that, when the park wall was built some time during the thirteenth century, one of these herds was coralled, mainly for food purposes but possibly also for sport. When raids took place from over the border, it would not be possible for the raiders to drive away a herd of wild cattle, and thus a source of food would be secured for the owners of Chillingham. Certain it is, however, that the wild cattle have been in Chillingham Park for the past seven centuries. During this time, so far as is known, no extraneous blood has ever been introduced, and for at any rate the past two centuries this is certainly true, since it has long been a family tradition that the herd be kept pure at all costs. As far back as 1795 Bailey and Culley, in their *Agricultural Survey of Northumberland*, wrote of the Chillingham wild cattle: "The wild cattle are only found in Chillingham Park . . . and it is probable that they are the only remains of the true and genuine breed of that species of cattle." In a footnote to the above statement they added: ". . . there may be found in two or three different parks of the kingdom, breeds of cattle which pass under the denomination of Wild Cattle; but we are inclined to believe that they have been contaminated by crossing, and that those in Chillingham Park are the only remains which answer the description . . . of this species of cattle."

The Herd Today No definite records of the herd's numbers are known prior to 1692, when in an old inventory they were re-

ferred to as "My Lord's Beastes". By the nineteenth century they numbered between sixty and eighty, and during the present century, from about 1925 until the 1947 storms, the numbers kept fairly steady at round about forty animals. In January 1947 there were thirty-three, but in April of that year there were only thirteen survivors—eight cows and five bulls—all the younger beasts having perished.

For about a year and a half no calves were born. Then came a succession of three bull calves, and it was not until over two years after March 1947 that the first heifer calf arrived. After that, a slow process of rehabilitation began, and the herd is now (May 1956) made up as follows:

Males	Females
1 old bull	3 old cows
1 bull (4 years), the "King"	5 cows (4½-6½ years)
1 yearling bull	1 heifer (3 years)
2 bull calves (8 and 10 months)	1 yearling heifer
	1 heifer calf (2 months)
5	11

From the point of view of domestic beef herds, it may be thought that the proportion of bulls is very high; but, even when the herd was between twice and three times its present size, the sex proportion was fairly constant in the same ratio of about two males to three females. However, nature ensures that only the best available blood is passed to the next generation by a principle of "kingship". The high proportion of bulls causes sharp competition among them, and only the strongest and fittest bull becomes the acknowledged "king" and leader of the herd, by reason of the fact that he can defeat in combat any other bull which may challenge him. During his "reign", only *he* serves the cows, until the inevitable day arrives when he is defeated in battle, whereupon he is temporarily banished from the herd and his successful challenger takes over leadership. After some weeks of banishment he may perhaps defeat the new "king" and temporarily regain his lost position; but age, if nothing more drastic, will eventually cause him to go into retirement. Death in a fight, although unusual, does sometimes occur, for a momentarily unguarded flank may receive one of those prodigious blows which is enough to pulp all the thoracic organs.

Since 1947, until a year ago, there was only one "king" bull. This means that *all* the present animals which are of breeding age are his progeny. In view of such intense inbreeding, the progress of the herd is being watched with the greatest interest by scientists and animal breeding experts. As the wild cattle are left without any sort of interference by man, they are, in fact, carrying out a natural experiment in genetics as extreme as on any research station.

The Chillingham wild cattle, though smaller, resemble in some respects the Shorthorn or Ayrshire breeds (except, of course, in colour). The live weight of a bull is about 10 cwt and of a cow about 7 cwt. They are straight backed, box-shaped, fine of bone, deceptively active (one has been known to make a standing jump of 6 feet!), and the cows have well-developed milk veins. The horns, which curve upwards from the head, turn slightly inwards, with the tips closer in the cows than in the bulls.

Primitive Instincts Breeding among the wild cattle normally starts at a later age than among domestic cattle, and a heifer usually drops her first calf when over four years old. However, some of the heifers born after the 1947 storms started calving at between two and a half and three years old, in an effort by nature, it would seem, to increase

numbers more rapidly. But the results were not very good: the few calves so produced were not good specimens.

When a calf is to be born, the mother leaves the herd and drops the calf in some secluded spot among the bracken. Not until it is about a week old will she bring it into the herd. In such a spot a calf may be found lying like a hare in its form, with chin out along the ground; but a sharp look-out must be kept for the cow, which will immediately attack if she sees anyone near her calf. Difficult calvings are rare and occur mostly when a cow is very old. In such cases, no human aid is possible until it is too late to be of any use, for the cow will attack any would-be helper so long as she has sufficient strength to get on her feet.

The Chillingham cattle still follow the ruthless law of the jungle whereby nature seems to have great concern for the species but none whatever for the individual. A sick or wounded animal is not tolerated. Any such usually goes away from the herd of its own accord; if not, the others speedily and forcibly drive it out. They seem also to have preserved some of their ancient instincts regarding animal foes such as wolves. They pay no attention at all to the shepherd's dogs, but if a pack of foxhounds comes into the park anywhere near them, the cattle will form themselves into a close little group preparatory to stampeding. Should they become further alarmed, they will then stampede in close formation with the cows in front, calves in the middle and bulls at the rear, with the "king" bull last of all. For many years the Chillingham cattle have not been hunted or shot, and thus they seem now to have become accustomed to the sight of man (some 3,000 visitors come each year to look at them), but they still retain their instinctive dislike of the scent of man and will move away if they are approached downwind.

Health and Management The wild cattle do not seem to be afflicted with the diseases found among domestic stock. Such troubles as hypomagnesaemia, mastitis, and Johne's disease, have so far been unknown amongst them. As they are rather prone to scouring (particularly the bulls in springtime), dung tests were made in January 1949 by Dr. I. W. Parnell of the Edinburgh School of Helminthology, with a view to discovering the cause. The results of the tests were surprising. He wrote:

> By the ordinary technique, no worm eggs were found in any of the samples, but by concentrating we found one worm egg in the sample from the calf. The cattle faeces were also examined for fluke eggs and for lung worm larvae, but we found none. The faeces from the cattle were taken to the Royal (Dick) Veterinary College for examination for Johne's bacillus, but their report was also negative.

Dr. Parnell then suggested that January was rather too early for such a test, and accordingly another was carried out in May. Again he reported a virtually negative result by the normal counting method, and that only a very few worm eggs were found by a concentration technique. Neither were any lung worm or liver fluke eggs found; and further tests for Johne's bacillus and salmonella proved completely negative. As a result of all this, it was concluded that the scouring might be due to some mineral deficiency, and so bricks containing a mineral mixture were provided. Soil tests showed that the land was acid (about pH 5.3) and low in magnesium. Bricks containing a high magnesium content were first offered, and the animals seemed to like these, but the bricks had no appreciable effect as regards scouring. In the following year, bricks with a high phosphate content were provided (with a view to promoting fertility). The wild cattle liked these also. In fact, they showed no particular preference for either type of brick, and neither scouring nor fertility seemed appreciably affected one way or the other.

As regards management, almost the only human attention they need is winter feeding. For this they are provided with good quality meadow hay; for, contrary to the suggestions of some who have advocated seeds hay, experts have advised that the hay should preferably be as near as possible to the kind of herbage they are accustomed to grazing. Winter feeding usually starts just before Christmas and continues until about mid-April. During this time they eat between a half and one ton per head, according to the severity or otherwise of the winter. They seek no shelter, other than the contours of the ground or the lea-side of woods, unless in search of food. There is a shelter into which hay can be put if heavy snow is falling, but the animals seldom bother about it unless food is there. Besides hay, they will also eat oat- or even wheat-straw—this was discovered during the 1947 winter when all hay had been exhausted—but they would not touch anything in boxes (for example, oats or cattle nuts) even when they were at starvation point.

The wild cattle have an area of about 365 acres in which to roam. Of this, about 260 acres is rough grass with considerable areas infested by bracken, and the remaining 105 acres is woodland. With the wild cattle is a herd of about nine-score South Country Cheviot ewes, to which the cattle pay not the slightest attention. The lower meadows in the wild cattle park are at an altitude of about 350 feet above sea level, and the land rises steeply to the eastward to form Ros Castle Hill (1,036 feet), up which the cattle can roam to about the 800 foot level. Above this, the hill has recently been reafforestated, and the cattle cannot go up there (though previously they never showed any inclination to do so).

The cost of maintaining the cattle is borne by the Chillingham Wild Cattle Association Ltd., whose present 250 members pay an annual subscription, and also, of course, by the public who come in considerable numbers to see them, even though Chillingham lies in a rather remote district. It is to be hoped that this unique species of wild life will continue to survive and that the herd will in due course regain its former numbers.

PILOT FARM

G. Ross, B.Sc.

National Agricultural Advisory Service, Northern Province

Mutual confidence between the farmer and the District Advisory Officer is an essential in the choice of a pilot farm. The aim is higher production and efficiency; and the farm is of great value for demonstrations during the development of the farmer's plan. Low West House, Tow Law, Co. Durham is an example of such a farm.

LOW West House Farm was chosen as a pilot farm since it was felt to be typical of the poorer type of marginal holding in the district. It consists of 272 acres, and in 1948 was made up of 235 acres of enclosed fell and 37 acres of poor meadow land. Most of the rough grazing occupied the northern slope of a steep valley, running down from 1,000 to 700 feet; the meadow land was in the bottom of the valley. The enclosed fell or rough grazing could be classified as being predominantly nardus with heather and gorse, and it had been badly damaged by shallow coal mining. All the meadow land was heavily infested by yellow rattle and yielded thin crops of very poor hay.

Store lambs were bred on the farm from a flock of approximately 60 Swaledale ewes, with 25 gimmers carried as flock replacements. A very limited number of cattle up to two years old were wintered, and a small retail milk round of the surplus from 8 or 9 cows provided ready cash. Approximately 20 cattle were agisted on to the fell each summer, and for this stock the tenant was paid the Hill Cattle Subsidy. Under these conditions it was extremely difficult to send cattle away in an improving condition, except in early autumn. Home-bred lambs were small and did not pay for overwintering, so it was the practice to buy in cheap but slightly stronger lambs to winter when the home-bred stores had been sold. Indoor accommodation for stock was limited and poor, there was no piped water supply to any of the land, and interior fences were non-existent.

The land proved to be extremely deficient in lime and phosphate. It was decided that, in any improvement programme where ploughing was involved, it would pay to give attention first to land drainage so as to obtain maximum response to direct reseedings. The great need was for better pasturage, but it was realized that as the summer stock-carrying capacity of the farm increased, the amount of hay available for winter keep would be a vital factor in the farm economy.

Five-year Plan The first area to be tackled was possibly some of the worst land on the farm, and lay on a steep hillside immediately north of the steading. The results were so convincing that plans were immediately laid for a progressive scheme of improvements to be spread over five years. A further 12 acres were ploughed in the autumn of 1949 and directly reseeded in 1950, and, in the same year, 8 acres of old meadow land were drained and directly reseeded.

Yellow rattle can be eradicated quite easily by other means than ploughing, since it depends on producing fresh seed every year. Continuous hay cropping, however, results in yellow rattle becoming widespread. In the spring of 1951, a badly infested meadow—unfortunately still far too typical of many upland farms—was drastically harrowed, and treated with ground limestone and basic slag. It was grazed hard for two years, and in the spring of the third year there was not a yellow rattle plant to be seen.

Levels of available phosphate appeared to drop very rapidly after the initial treatment of the land for direct reseeding. Heavy initial dressings of phosphates so easily become locked up in this type of land that, for pasture maintenance, a little but often must obviously be the rule. It was decided at this stage that all future reseedings should be preceded by one or more pioneer crops, using (a) rape, (b) mixtures of rape, Italian ryegrass and hardy green turnips, and (c) thousandhead kale, to provide sheep grazing over an extended period. The inclusion of pioneer cropping immediately altered the whole pattern of the sheep husbandry. More home-bred hoggs could be wintered, and small lambs bought in to winter on such forage did remarkably well. They got off to a good start the following spring, and yielded heavier fleeces. An adequate run-back on to adjoining pasture land is, however, essential to such sheep during the winter. By the autumn of 1953, approximately 100 acres of improved land had been fenced and drained where necessary, and piped water had been laid to most of the enclosures.

The remaining 172 acres of fell land determined how many blackfaced breeding sheep could be carried throughout the year, but as the land improved, so also did the stock. Blue-faced Leicester rams were introduced in 1952 to breed Mule lambs from draft ewes. The farm now has its own flock of home-bred Mule ewes, which, in their turn, are producing excellent Suffolk cross fat lambs.

Great care is taken to maintain the blackfaced Swaledale ewe flock in a hard and fit condition, and the animals are encouraged to forage for themselves as much as possible. Tupping is done out on the rough ground, and the ewes are grazed on slightly improved rough grazing in the spring before being brought in-bye to lamb. The Swaledale flock is still the nucleus around which the activities of the sheep husbandry on this farm revolve, and it is extremely important that they maintain their hill hardiness and vigour.

More Stock and Better Quality Considered in retrospect, a large part of Low West House had been converted in less than five years from a rough marginal farm to land which will produce fat Suffolk cross lambs of first quality. The fell sheep, however, were subjected to very considerable nutritional changes when brought inside to lamb. To counteract this, a fairly large area of the fell was enclosed and improved by surface treatment. It was heavily pitchpoled and limed, and North African phosphate was applied. This land was to be used for transitionary grazing between fell and reseeded pastures, and so useful has it proved that a further 20 acres will be enclosed in the near future.

Rotational grazing has been stressed almost from the beginning, and hay has been taken from every enclosure where it was humanly possible to do so. On-and-off grazing has done much to minimize internal parasitic infestation of sheep, and although at times sheep stocking on in-bye land appeared to be at saturation point, very little trouble has been experienced.

Little mention has so far been made of cattle, but with improved grazings, efficient fencing and adequate water supply, the obvious first step was that of attestation. This was achieved with very little trouble, and the farmer settled down to the breeding of good quality beef stores. The cows are predominantly of the Dales Shorthorn type, and breed very desirable calves to the Galloway bull. Like the sheep, cattle numbers increased with the new-found productivity. Soon, additional indoor accommodation was required. The existing byres were accordingly improved and a new hemmel* was erected, with the help of a grant under the Livestock Rearing Act. More 18-months-old stock can now be carried through the winter, thus providing more dung for the following year's hay crop. The breeding herd now consists of 25 cows and heifers. Cows calve down about February, and the calves are well grown before being turned out with their dams on to spring grass. February calves can make full use of the spring flush of milk, and, although calving dates cannot always be arranged to order, much milk is often wasted by putting immature single-suckled calves on spring grass.

Low West House is essentially a grass farm, and all mechanical work is done by outside contractors. The farmer does well to manage the total stock with the assistance of a lad, but extra help is needed at dipping and clipping time. With this organization, the net output of the farm exceeds £650 for every £100 spent on labour—a figure which many successful arable farmers would like to equal.

All the suitable land has now been ploughed, and further improvements will consist of surface treatment on chosen parts of the fell, which now occupies approximately 154 of the 272 acres. More intensive utilization of the improved land is being considered, probably by temporarily fencing the pasture enclosures to reduce their size and thus facilitate a modified form of paddock grazing. Reseeded land will be ploughed at regular intervals and pioneer crops introduced, since they play such an important part in the farm policy.

* An open-fronted shed.

Improvement Pays A yearly economic survey of this improvement plan has provided the farmer with an added incentive to carry on with the work. Valuations are taken every October, and the following figures indicate how livestock production increased as more land was treated.

Valuations at October 21

Year	Cattle		Sheep		
	Breeding Stock	Store and Young Stock	Breeding Stock	Store and others	Total Value £
1950	11	18	119	112	1,822
1951	12	33	134	117	2,208
1952	25	25	150	155	2,726
1953	29	34	210	166	4,001
1954	27	19	175	202	3,719
1955	31	39	171	280	4,465

The slight drop in cattle numbers in 1954 is explained by the fact that the breeding stock was being replaced at the time by pedigree Galloway stock, and several Shorthorn cows and heifers were sold. More sheep stock was also bought in during this period to utilize the extra grass available.

It is interesting to note that the closing valuation of livestock in 1955 is approximately two and a half times the 1950 figure. And that is after £2,240 worth of sheep and cattle had been sold off during the trading year—a figure which in itself is well above the entire stock valuation in 1950. In the five years, breeding cattle numbers have been increased threefold, breeding sheep by approximately 50 per cent, and store sheep to be carried into the winter have increased by 150 per cent.

The gross livestock output in the year 1954-55 was £3,702—a very satisfying achievement from 14 acres of pioneer crop, 72 acres of pasture, 32 acres for hay and aftermath grazing, and 154 acres of fell land which itself is not capable of carrying more than one blackfaced ewe per acre.

The net output of the farm over an equivalent period has been:

Year	Net Output of Farm £
1950-51	1,541
1951-52	1,618
1952-53	2,498
1953-54	2,296
1954-55	3,631

Inputs of fertilizers and lime have been associated in the main with the improved portion of the farm and reached a maximum of £3 15*s.* an acre in 1953-54. Expenditure on fertilizers in the future will be concerned chiefly with the maintenance of fertility, as opposed to the building up of fertility, and this should result in an appreciable reduction in cost.

Third British Weed Control Conference

November 6-8, 1956

NORBRECK HYDRO, BLACKPOOL

Inquiries about enrolment and accommodation should be addressed to the Conference Treasurer, Mr. W. A. Williams, Cecil Chambers, 86 Strand, London, W.C.2, and on all other matters to Mr. S. A. Evans, Department of Agriculture, University of Oxford.

KING'S COLLEGE

H. CECIL PAWSON, M.B.E., M.Sc., F.R.S.E.
Professor and Assistant Director in Agriculture, King's College, Newcastle upon Tyne

The story in brief of one of Britain's pre-eminent agricultural colleges and research centres.

NORTHUMBERLAND was a pioneer in the field of county agricultural education, and through the initiative of the County Council was largely instrumental in bringing about the formation of a Department of Agriculture in King's College, Newcastle (originally known as the Durham College of Science). The College had its first grant from the Treasury in 1891-92, and Northumberland County Council made a similar grant in the same year for the express purpose of enabling a Chair in Agriculture to be established. Professor (later Sir) William Somerville was the first Professor of Agriculture in the College and was appointed in 1891.

Early Days For the first few years the number of agricultural students varied from three to twelve for different courses, and Somerville had to draw considerably on other departments of the College for teaching and, as the number of students increased, for accommodation as well. The Department continued to develop and later a grant from Durham County and other assistance enabled Somerville to appoint a small staff to assist him in teaching the multiplying subjects deemed necessary for the agricultural curriculum.

The work to be undertaken by the new Agricultural Department was described in nine paragraphs, No. 5 being of special interest in view of subsequent progress. It ran:

> The delivery of pioneer lectures in small towns and villages explanatory of the system of instruction adopted at the College and throughout the district.

Somerville, with his few colleagues, were unflagging in their zeal to implement this, so to speak, missionary programme. For instance, out of a total of 687 lectures given at centres in the counties of Northumberland and Durham by the whole of the College staff in 1892-93, 220 were given by the new Agricultural Department.

Another activity of this young Department which resulted in major developments in agriculture in the northern province, was the laying down of manurial experiments on farms situated within the two counties. Somerville reported in 1893:

> The manurial experiments in the various temporary stations in Northumberland furnished results of considerable interest and importance which have formed the subject of a special report. This experimental work has been continued and extended during the present session, and the county of Durham has now been provided with six stations.

Cockle Park Acquired Somerville started this work with eight experimental stations (as they were described) in Northumberland, for the purpose of combining experiment and demonstration. Manures and seeds were supplied from the College after sampling, analysis and blending, according to the requirements of the particular experiment; the crops were weighed and tested by the staff of the Agricultural Department.

In 1896 an important decision was made arising out of the success of these "outside" activities of the Agricultural Department. By this time, there were forty-six local centres in the counties of Northumberland, Durham and Cumberland, comprising 817 demonstration plots and covering a total of over 90 acres. Useful as these demonstrations proved, the value of centralizing such work, particularly for experimental trials, became increasingly clear. The project of obtaining a suitable farm for the establishment of an experimental station was therefore set on foot, and this in time led to Cockle Park becoming the Northumberland County Agricultural Experiment Station. This farm, situated 19 miles from the College and a mile and a half from the main North Road (A1), is now known throughout the world mostly for its grassland improvement research. Though it was mainly due to Professor Somerville's enterprise that Cockle Park was secured, special mention should be made of Mr. Charles Williams, at that time Director of Education for Northumberland, for his keen interest and support in carrying the scheme through, and of Mr. H. Spink who, in later years, succeeded him as Director.

From the outset the scientific direction of the work at Cockle Park was entrusted to the Department of Agriculture, the Professor of Agriculture being designated Scientific Director and *ex officio* a member of the Station Special Sub-Committee. Thus began a very happy and fruitful collaboration between the County Council and the Department, which continued for over fifty years.

Cockle Park Established The fame of Cockle Park owes an incalculable debt to the work of the great trio of Directors of the Station during its first thirty years; namely, Somerville (1896-1900), Middleton (1900-2) and Gilchrist (1902-27). The first-named demonstrated the value of basic slag in the treatment of poor grazing land and, on Tree Field plots, introduced the method of measuring the effects of fertilizer application by the liveweight increase system. He also demonstrated the best manurial measures to adopt for the improvement of the annual permanent meadow hay crop, and began a rotation experiment which was continued until 1955. Middleton continued the work of Tree Field but added much to its value by laying down the Hanging Leaves Pasture trial plots, which were large enough to enable cattle and sheep to graze together, as distinct from the single stocking with sheep on Tree Field. Thus he provided striking evidence of the value of close, even grazing management if the best results from slag treatment on poor permanent turf were to be obtained. Gilchrist made an outstanding contribution by his introduction of wild white clover to a seeds mixture for a long ley, his simplification of the mixture for this purpose, and his insistence on the need of generous treatment with phosphates for the full exploitation of the use of wild white clover.

No summary, however, can really be made of the tremendous influence of these and many other examples of the Cockle Park experiments, not only on the farming of the north, but of Great Britain, and, in more recent times, on the introduction of State assistance measures for the improvement of vast areas of grassland by surface treatment or reseeding. Space forbids more than the mention of Professor J. A. Hanley, and the late Professor R. W. Wheldon, who were subsequently responsible as Directors for the continuance and development of the Cockle Park work.

When the future of Cockle Park had to be reviewed in 1947, it was decided that its ownership should be transferred to the College for continuance as a research farm. When purchased by the County Council in 1937, plans were set on foot to build a new range of farm buildings—sorely needed—but the

1939-45 war and other circumstances frustrated this intention. It is only now (1956) that this long-desired improvement has commenced.

The more successful Cockle Park became in research, however, the less useful in certain respects it became as a farm on which to demonstrate to students and farmers the best commercial management. The plots on this 400-acre farm would number 1,000-1,500 each season, which considerably complicates the management of the farm. Thus in 1944, the College took advantage of the opportunity to acquire the tenancy of the 742-acre farm known as Nafferton, on Viscount Allendale's estate and situated 12 miles from Newcastle on the main west road to Hexham and Carlisle. Here, dairying and alternate husbandry are the main features, and the farm, run on strictly commercial lines, demonstrates for the benefit of students and all who visit it, the successful application of modern methods and research to practical farming. The School is thus extremely fortunate in having two College farms; one mainly devoted to research, the other to the business of practical farming. By the recent purchase (in June 1956) of the adjoining farm, known as West Tritlington, the College now farms at Cockle Park an area of about 700 acres.

Advisory Centre For many years the Department of Agriculture had been housed in two rooms in the main College block, but in 1912 the Board of Agriculture offered to meet half the cost of a new building, provided local help would supply the remainder. Happily, the College numbered amongst its friends Dr. Clement Stephenson, F.R.C.V.S., of Balliol College Farm, Benton, Newcastle upon Tyne, who generously came to its aid and later bequeathed £5,000 to the Agricultural Department. The total cost of the new building, in which the Department is still housed, was £13,000.

In the same year (1912) the Board of Agriculture set up an Advisory Service for farmers throughout the country. This led to the establishment of Provincial Advisory Areas with their centres, and the Department became the centre for the Northern Province (Northumberland, Durham, Cumberland and Westmorland). Specialist Advisory Officers, along with the general agricultural staff of the Department, thus served the northern farmers in co-operation with the County Agricultural Organizers, until the establishment, in 1947, of the N.A.A.S., which has its headquarters at Elswick Hall.

Alma Mater Regular visits are made by the College students to other farms in the province, for a very happy friendship has existed all through the years between the School and North of England agriculturists. The same invaluable spirit applies to the relationship with the N.A.A.S., the Farm Institutes in Northumberland and Durham, and the Cumberland and Westmorland Farm School near Penrith, as well as with the County Agricultural Committees, members of staff of the University School serving on committees associated with these bodies. The School of Agriculture is humbly proud to act as a kind of agricultural *alma mater* to all in the northern province who by agricultural education seek to further the progress of our oldest and most important industry.

For over sixty years, then, the tradition of service to the agricultural community, so ably initiated by Sir William Somerville, has been continued. This service has consisted in the training of young men and women in agricultural science, and in advisory and research work for farmers and others concerned with agriculture. Many past students are engaged in practical farming at home and overseas, and others hold responsible positions in all branches of professional agriculture, including seven who are

holding Professorial Chairs. The courses of study include the degrees of B.Sc. in Agriculture (Pass and Honours), M.Sc. in Agriculture, and Ph.D. The College is also the national centre for the teaching of agricultural engineering, and provides a two-year post-graduate course in this subject and that of farm mechanization, leading to the degree of M.Sc.

The Agricultural Students' Association—one of the earliest of its kind—was begun in December 1899, and, like the College itself, has developed healthily. Since 1944 this Association has been reconstituted as the King's College Agricultural Society, divided into student and senior divisions.

The future seems to hold much promise of still greater development and success under the dynamic leadership of Professor M. McG. Cooper, formerly of Wye, and now Dean of the Faculty of Agriculture in King's College. The College and School are fortunate in having as Rector of King's College, Dr. C. I. C. Bosanquet, a landowner and farmer in Northumberland, who owns one of the oldest and most famous flocks of pedigree Border Leicester sheep and who, by his keen interest and constant encouragement, has done much to further the work and service of one of the oldest University Schools of Agriculture in England.

BARN HAY DRYING

W. L. HEARLE, A.M.I.E.E., A.M.I.B.A.E.

Barn-dried hay is a quality product akin to dried grass in feeding value but much cheaper to make. It has a definite place on the small dairy farm, where handling and feeding silage may be a problem, and in the wetter areas, where ordinary haymaking is a risky business.

MUCH has been written about the vital place of the grass crop and of the need for its efficient utilization in the economical production of milk and beef. The importance of better methods of grass conservation for winter feed has also received wide attention, with the accent mainly on silage-making. Yet Hamilton* states that although hay and silage account for over 95 per cent of all grass conserved in Britain, 90 per cent of this is still in the form of hay. There is undoubtedly a need for more intensive silage-making, but these figures suggest that there is also a strong case for complementary or alternative systems, particularly those producing high quality hay with less weather risk and at little cost.

In recent years, barn hay drying has made considerable progress, particularly in the north-west, where it has been shown that barns equipped for blowing cold air can produce a quality of hay very close to, and sometimes as good as, dried grass at only a fraction of the capital and running costs. Briefly, the system reduces the time during which the grass is at the mercy of the weather, between cutting and carting, to 24-40 hours. In other words, cutting one day and housing the next is the usual practice. Throughput or capacity depends entirely on the amount of suitable barn space. As with tripod curing, the rate of drying varies with prevailing atmospheric humidity; hence, it is desirable to have as large a floor area with as much height as possible.

* Utilization of Grassland (2). R. A. Hamilton. *Agriculture*, 1955, **62**, 411.

Typical of barns adapted to this system is the Lancashire stone barn, with a central drive in and a hay storage bay on either side. These two bays often hold the bulk of the hay made on the small dairy farm and, when each bay is fitted with the appropriate fan, wire-mesh floor and sheeted up at the front to a maximum loading height of 14 feet, the total amount dried in one filling of the two bays is about 24 tons. In some cases, particularly where quality rather than bulk has been the aim, this quantity is considered sufficient for the maintenance of twenty milking cows and can, where good grass has been cut at the right stage, contribute to production as well. This arrangement is particularly advantageous from the labour point of view, since the material is handled only once and is fed during the winter straight from the two drying bays into the adjacent shippon.

Where greater quantities are required than can be obtained from the single filling of the two bays, the first 24 tons can be baled after drying and stored elsewhere, thus making room for a second filling of the two bays.

With good grassland management and alternate grazing and cutting, three fillings are possible in the season, particularly where an early start is made and the grass is cut younger than at the normal hay stage. The time factor here is, of course, the determining factor, and 14-21 days should be allowed for each complete filling and drying. This usually fits in with an early cut of, say, 20 acres in late May or early June, a second in late June, and a third (usually second crop) in late July or early August. With suitable management, 60-70 tons of superb hay of dried grass quality can be made in this way.

Management is All-important As with any other system of efficient grass conversion, management is all-important. Although no hard and fast rules can be made—and the system does have a certain amount of flexibility—two points need stressing. The first concerns the field treatment of the grass during the wilting period, when plenty of tedding and turning is essential for even and rapid wilting to 50 per cent moisture content. This aspect cannot be over-emphasized. The second involves the filling of the drying bays. In this operation the wilted grass must be pitched, elevated, or blown up on to a loading platform, from where it is shaken out evenly over the whole area. Where two bays are in use they should be filled alternately in stages. Assuming that the grass is cut when the yield is about a ton to the acre, and that the space available is two bays of 400 sq. feet each, then about 3-4 acres can be cut every other day. The filling is therefore also done every other day, the initial depth of loading being 8 feet. As this settles, more is added until the grass in each bay reaches the height of the loading platform—usually about 14 feet. In this way, the two bays will be filled in about ten days, in which time 20 acres will have been cleared.

Of the twenty-five or so farms equipped for barn hay drying in the north-west, about half have more than one bay converted, and there is no doubt these have a definite advantage. Some of the earlier installations had only one small bay available, and, although these are producing good quality material, the amount that can be handled in a given time is limited. This factor probably led to earlier impressions that barn hay drying was too slow, but where the system is designed and installed to handle the quantity required for the individual farm, there is every indication that the bulk of the grass can be conserved at an ideal stage of growth. The more successful users of barn hay drying are, of course, those who are improving and planning their grassland to fit this system of conservation. In some cases hay is used in conjunction with silage, and here even a single-bay installation

can help to cope with the peak production of grass during late May and June, and so provide a small quantity of super-quality hay to feed with silage.

High Quality — Low Cost The total capital cost of converting, say, the Lancashire stone barn mentioned earlier to provide two bays each of about 400 sq. feet, with 16 feet to the eaves, is about £330. The fan or fans cost very little to operate. With electricity at 1*d*. per unit, these costs have averaged 17*s*. per ton over a period of four years on a number of farms. Labour needs are estimated by some farmers to be similar to those required for field haymaking, and by others as much less. If, however, the bays are filled a second or third time, double handling naturally comes into the calculation. A conservative estimate for overall costs from cutting to the final baled product can be taken as £5 per ton.

The quality of the hay made in the barns has proved superior to that of field hay made under ideal conditions. Indeed, some of the analyses which have been carried out have put this feed into the dried grass category. It is obvious, of course, that the time of cutting and initial quality of grass will largely determine the final value. Losses during the short wilting period are very small, and losses during drying are little or none, being only likely to occur where the wilted material has been unevenly or heavily thrown into the barn.

A starch equivalent of 58 and protein equivalent of 9.4, which has been obtained where management has been good, indicates that maintenance plus one or two gallons from this product is more than a possibility.

A general lack of appreciation of what high quality hay really is and what it can do is probably the reason why the barn drying system has not gained favour faster than it has. Although it was originally foreseen as the small dairy farmer's grass drier, there are indications that the large arable and dairy farmer is finding the installation advantageous when it is planned as a grain drier as well. On such farms, where large stone barns may not always be available, several bays of a Dutch barn have been shown to be capable of conversion, though at rather greater cost.

In drying grain, heat is, of course, necessary for reducing the relative humidity of the air, and where such heat is available it might usefully be used for the hay-drying process as well, provided that it can be automatically controlled by the prevailing relative humidity. Although heating would increase the running costs, it may still be economical where good grass is used, since it reduces drying time and enables complete filling and emptying to be carried out in a shorter time.

Although barn hay drying as a method of conservation is not necessarily in competition with silage, there is no doubt that it can produce a quality of feed quite equal to, and mostly better than, silage made from similar material. On farms well set out for silage-making and feeding it will prove a valuable complement at little cost. There are, however, many thousands of small farms where the handling and feeding of silage in the winter is a real problem and a tedious operation. On such holdings barn hay drying on a scale appropriate to the size of holding may well solve one of the big problems in grass conservation.

So many Market Containers The exhibition of containers used in marketing horticultural produce, held at the Old Exhibition Hall of the Royal Horticultural Society in London on June 6-7, sharply focused the attention of all who saw it on one of the main problems of the industry—the bewildering diversity of containers in use today. Over 700 of them, involving all manner of materials—metal, wood, plastics, fibreboard, cardboard, hessian, cane, diothene film—and in a variety of sizes, were on display. No less than thirteen countries were represented, and, since most of the containers were intended for internal transport, many of the exhibits were new to British growers.

Organized by the Ministry of Agriculture, Fisheries and Food, in association with the European Productivity Agency of O.E.E.C., the exhibition—the first ever of its kind—was staged in conjunction with an international conference on the same subject arranged by O.E.E.C. and also held in London.

This conference and the exhibition are encouraging steps towards a closer understanding of the needs and difficulties of growers in different countries, and it is to be hoped that from them will emerge a more purposeful movement to define or select the most suitable containers for each kind of product. The exhibition stands of the British Standards Institution and of the Economic Commission for Europe, the latter carrying samples based on the recommendations made by the Working Party on the Transport of Perishable Foodstuffs, showed what has been done so far to resolve the problem. It is now up to the individual growers, manufacturers and distributors to look again at the various containers which they favour and see whether they cannot voluntarily reduce or adapt the range to something more manageable. One consequence of such standardization would inevitably be a reduction in production cost—and that would be welcomed by producer and consumer alike.

Farm and Forest: 16. Care of Planting Stock Lack of proper care of young forest trees during the critical spell between lifting in the nursery and planting in their final positions is a serious source of loss and disappointment. It is particularly apt to occur on a farm where trees are only needed at intervals of a few years, and where they commonly come in small quantities from a distance, arriving perhaps at an inconvenient time. Any one of three factors may critically damage the delicate roots of young trees, so all must be avoided. One is the drying out of their roots through exposure to drying winds; another is frost; and a third, rather surprisingly, is heating up, due to the trees being kept too long closely packed in bundles, so that they warm up just as a hay-rick does.

If trees arrive during mild weather, when the staff are not otherwise busy, the best thing to do is to plant them right away. But often they come at a time when all hands are needed for some other job, or when the weather is frosty, snowy, or just hopelessly wet. Then the right thing to do is to "heel them in" in shallow trenches, with their roots just covered with loose earth and their foliage exposed above ground. If, as is usually the case, they come in bundles, the twine should be cut, and the trees spread out loosely; this brings all the roots into contact with the moist earth and prevents heating up. Treated in this way, the trees may safely be left for several days, or even weeks, until conditions are suitable for planting.

Sometimes the trees arrive when the ground is frozen so hard that it is impossible to dig a trench in which to heel them in. Then they should be stored in an outhouse, preferably with a stone floor, being set in *small* heaps with their roots inwards, away from the frost, and their foliage outwards. Never make big piles, which readily generate heat. Avoid watering, unless the roots are very dry, as that may also lead to heating up.

For carrying the trees over the planting ground, it is well worth while using a planting bag. An old haversack, or even a sack with a loop of rope to go over the shoulders, will serve. The object of this is to shield the tree roots from drying winds, so that they are still moist when they are thrust into the ground. It also ensures that the planter has both hands free for his job, and that he does not waste time walking to and fro for small quantities of trees.

Often there will be a surplus of trees when planting is completed. These should be "lined-out" on a piece of spare ground to grow on until the next planting season. At that time it will usually be found that, no matter how carefully planting was done, a small proportion of the plantation trees have failed. Minor losses, up to 10 per cent of the crop, can be ignored, but over that figure it is best to make good the blanks with fresh trees. It is simpler and cheaper to do this with surplus stock than to place a fresh order.

Although special equipment is used for "lining out" in nurseries, on the farm the garden spade will serve for the small number involved. Select well-tilled ground protected from stock, dig a trench, and space out the young trees about four inches apart. Further trenches may be added, if required, each being about one foot from its neighbour. Set the trees at their natural depth in the soil, and firm the earth round their roots. These lining out, or transplant, beds will require summer weeding with the hoe, but no other attention. The trees will make a moderate amount of growth during the summer, but will still be small enough for planting out next autumn.

H. L. Edlin,
District Officer, Forestry Commission

Care of the Sheep Dog Something of the debt which we owe to our sheep dogs is acknowledged in a new booklet* issued by the Department of Agriculture for Scotland in association with the Ministry of Agriculture. The author is Dr. J. Russell Greig, C.B.E., who estimates that there are probably 35-40,000 sheep dogs in the United Kingdom. In Scotland, the northern counties of England and in Wales, most of them are of the Border Collie type—alert, sagacious, agile and faithful to a marked degree. Maybe we are inclined to forget sometimes that if it were not for these hard-working dogs, sheep-keeping on the rough moors and hills would be quite impossible. In mountainous country sheep will scramble over terrain where only a dog can safely dislodge and restore them to the flock. And such is the deep understanding between the shepherd and his dog—almost the sharing of a common instinct—that the very minimum of orders is called for. How many sheep, we wonder, would have been lost in snow-drifts had it not been for the dogs' tireless searching?

During lambing time, the hill shepherd may have to traverse some 20-25 miles a day, often in difficult country and in all weathers. His dog, of course, must travel very much more. Dr. Greig reports that a leading Scottish Border flockmaster measured, by a pedometer, the distance which he covered daily during a lambing season: "His ground is typical of the southern Scottish Uplands: steep in places, rough and broken, with many coarse tussocks and wet, mossy areas. He found that during each of the twenty-eight busiest days of lambing he travelled a distance of 30 miles; during the remaining fortnight he travelled about 25 miles daily. Two dogs were employed, and it was estimated that each covered at least three times these distances and so probably traversed considerably more than 100 miles each day."

* The Sheep Dog: Management and Feeding. H.M. Stationery Office. 1*s.* 3*d.* (1*s.* 4½*d.* by post).

This new booklet is directed at a re-examination of the physical welfare of the sheep dog, which, strangely enough, has attracted comparatively little attention. Dr. Greig discusses the dogs' feeding, both in principle and in practice, during pregnancy, nursing, puppyhood and adult life. Kennelling conditions are often more rigorous than they need be, and whilst it is agreed that coddling should be avoided, reasonable warmth and comfort are not too high a reward at the end of the day for the invaluable services which these dogs perform for man.

Agricultural Research in England and Wales On April 1, 1956, the Ministry of Agriculture, Fisheries and Food transferred to the Agricultural Research Council its functions in relation to the independent agricultural and horticultural research institutes in England and Wales, including responsibility for the making of grants. The Ministry has exercised these functions continuously since the Board of Agriculture Act was passed in 1889. The research activities of the Ministry's Veterinary Laboratory, Plant Pathology Laboratory and Infestation Division are not, however, affected by the change.

The Agricultural Research Council will continue to be responsible to the Committee of the Privy Council for Agricultural Research. This Committee has been reconstituted and in future will consist of the Lord President of the Council, the Minister of Agriculture, Fisheries and Food, and the Secretary of State for Scotland. Under this arrangement the Minister's concern with agricultural and horticultural research will be maintained through his membership of the Committee of the Privy Council.

As a further step to maintain the present close association of the Ministry with agricultural research, the Charter of the Agricultural Research Council has been amended to provide that in future the Chief Scientific Adviser (Agriculture), the Chief Veterinary Officer, and two senior administrative officers (one from the Ministry and one from the Department of Agriculture for Scotland) will be ex-officio members of the Council.

Under the provisions of the Agricultural Research Act, 1956, agricultural research will now be financed through a fund made up of monies voted by Parliament for this purpose, and the Agricultural Research Council will account direct to Parliament for expenditure from this fund. These new arrangements do not alter or modify the powers and responsibilities of the Council as set out out in its Charter, nor do they affect the status of the scientists employed either directly by the Council or by the independent grant-aided research institutes in England and Wales. The only difference is that from now on these institutes will be supported by grants in aid from the Council instead of, as hitherto, from the Ministry.

Flourishing Y.F.C.s With so much talk about the drift from the land, it is heartening to find that, in one sphere at least, agriculture is not losing its appeal. For during 1955 the membership of the Young Farmers' Clubs of England and Wales rose by nearly 3,000 to a total of over 70,000, and the number of clubs increased to a record number of 1,584. Nor have we much to fear as to the quality of the next generation on our farms if the wide activities reported in the 1955 Annual Report* of the National Federation of Young Farmers' Clubs are any criterion.

A particularly interesting development of the Federation during the last five years has been the introduction of proficiency tests in farm and farmhouse crafts. It is not without interest that by far the greatest number of

* Copies are obtainable free from the Central Office of the Federation, 55 Gower Street, London, W.C.1.

successes in last year's tests occurred in root hoeing and singling! Tractor ploughing, machine milking and hedge laying were some way behind.

Research at Rowett Since it began work in 1914 in temporary premises at the University of Aberdeen, the Rowett Institute has gone from strength to strength, until today it has most up-to-date buildings, a 500-acre farm, a scientific staff of eighty-three and a total complement, including animal attendants and farm workers, of some two hundred. The results of its research in the field of animal nutrition have echoed around the world, so that during the past years workers have come from countries as diverse as Australia, Jamaica, Egypt and Yugoslavia to assist in the investigations being carried out there.

The results of work at Rowett are regularly published in some ten technical journals, but, in addition, every year the collected papers of the Institute are issued in one volume. To help those who may have difficulty in consulting a copy of these collected papers, the Institute is offering free to research workers a Preface to the collected papers of 1954-55, containing a summary by the Director of the contents of the full volume so arranged as to give the continuity of development. In addition, there are lengthy reviews of work done in two fields of the Institute's activities—namely, "Micro-organisms concerned in the Fermentation of non-cellulosic Carbohydrates in the Rumen," by Dr. A. E. Oxford, Head of the Microbiology Department, and "Pig Research, 1948-55," by Mr. I. A. M. Lucas of the Applied Nutrition Department.

Copies of the Summary and Subject Reviews may be obtained from the Librarian, The Rowett Research Institute, Bucksburn, Aberdeenshire.

Explosives used for Poplar Planting The Forestry Commission has recently been experimenting with the use of gelignite in planting poplars on heavy soils, where establishment is usually slow and difficult. By blowing a hole with explosive, a considerable disturbance and fissuring of the soil occurs around the sides of the hole, and this, it is hoped, will allow better root development.

Two experiments have so far been laid down—at Alice Holt Forest, Hampshire, in the spring of 1955, and at Cannock Chase, Staffordshire, in April of this year, using charges in the form of 1.6 and 4.0 oz cartridges. At Alice Lodge, detonation was by slow-burning safety fuse, and at Cannock Chase by electrical contact. The cartridges were inserted to a depth of between 18 and 24 inches, according to the nature of the soil. Generally, the holes prepared by the smaller charge were equal in size to normal pits dug by hand for poplar—that is, 15-18 inches square by 15 inches deep.

It is not expected that beneficial results will be seen at either site until the second and third seasons, and even then any real improvement is likely to be long-term. It is not known, of course, how far the soil has cracked away from the hole, nor is it certain whether the blasting effect of the explosion compacts the sides of the hole to such an extent that root penetration is in places inhibited.

The cost of materials, preparing and planting in holes blown by the smallest charge compares favourably with planting by hand. Because of the greater loss of soil with a larger charge and the fact that much more time has to be spent in filling, costs increase proportionately with the size of the explosive, though not to an uneconomic extent. The improved growth of trees planted in the larger holes may well justify slightly greater costs. Moreover, the technique is by no means perfected, and it is to be expected that costs will be considerably reduced as greater experience is gained.

IN BRIEF

Heather and Hill Sheep

Heather is not the least of a hill farmer's assets. It has a high calcium content and is rich in those very necessary elements (sometimes confusingly called "minor") iron, manganese, copper and cobalt. To it, the usually healthy condition of hill sheep is largely attributable, and in winter a bite of heather may well mean the survival of the flock. Such an asset is therefore well worth looking after.

The proportion of young, green, edible shoots varies with age and the season of the year. As the plant ages, it becomes woody and produces fewer green plants in spring. Good management therefore consists of burning the heather at regular intervals in a rotation which may vary from 8 to 15 years. But heather moors vary widely in soil, climate and altitude, and these factors influence the length of the burning rotation. On dry, hard moors bearing short, slow-growing heather, burning may be done at longer intervals than on deep peat moors with quick-growing heather. Old, woody, coarse heather limits the free range of the sheep, and may also drag much wool off their bellies.

However, burning too frequently has a bad effect on other useful moorland plants, particularly the valuable draw moss which makes a very important contribution to the diet of hill sheep during February and March.

Carotene and Crop Drying

Carotene, present in green fodder crops, is converted into vitamin A in the animal's body. The artificial drying of green crops is an important method of conserving carotene as well as the major nutrients present, and the resulting dried product is thus a valuable source of carotene, and hence of vitamin A, for addition to compound feedingstuffs, especially those for pigs and poultry. But carotene is liable to destruction from oxidation by the oxygen present in air, and dried green crops, necessarily produced in the spring and summer months of the year and stored until the time of their incorporation into compound foods, steadily lose a significant proportion of their original carotene content during storage.

Dr. V. H. Booth at the Dunn Nutritional Laboratory, Cambridge, who has recently been investigating this question, found that even when stored in paper sacks under commercial conditions, dried grassmeal may lose as much as half its carotene content in seven months. For feeding to dairy stock as protein, this loss does not perhaps matter greatly, but for pigs and poultry the deficiency must be made good by supplements to the ration.

A review of Dr. Booth's booklet on this subject appears on p. 200.

Workington's Early Shows

Cumberland can lay a fair claim to have instituted what may well have been the forerunner of today's "Royal". At any rate, as far back as the early 1800s, the Workington Agricultural Society organized an annual event at the Schoose, Workington. Handsome prizes, open to Cumberland, Westmorland and the Isle of Man, were offered for the best examples of good farming practice. There were also "open" classes for livestock. In the President's report for 1806 there are many references which suggest that

crop yields were in some cases equal to those of today. There is mention of a herd of cows with a 600 gallon average, and evidence that various farm enterprises were costed, even in those days.

Record Use of Fertilizers

The Financial Times reports that Britain's farmers have been using record quantities of fertilizers this season, the demand for certain types (particularly nitrogenous fertilizers) at times outstripping supply. The past fertilizer year (which runs from July to June) got off to a good start during the mild weather of last autumn, when farmers were able to sow an increased acreage of autumn wheat. This resulted in a big seasonal increase in fertilizer consumption, particularly compounds and basic slag.

In spite of higher consumption during the autumn months, however, the major demand this year, as in previous seasons, has been in the February to April period. The fact that three-quarters of the annual consumption of fertilizers in the United Kingdom is applied to the soil by farmers in these three months has been a constant problem for the manufacturers.

To encourage farmers to take early delivery and hold their fertilizers in store until they are wanted, manufacturers offer rebates. Typical rebates range from about 6 per cent for fertilizers purchased during July and August down to 2 per cent for deliveries in January.

Modern fertilizers, especially the granular type, will store without loss of any nutrient value.

World Increase in Farm Tractors

The latest figures issued by F.A.O. show that the total number of farm tractors in use throughout the world (excluding Russia) is 7,100,000, and that their number is increasing by nearly half a million a year. It is noteworthy that the highest proportional increase has been in the Far East—from 13,000 to 20,000 in the three-year period 1952-54. In Europe, tractor strength increased by 31 per cent to 1,660,000, and in Latin America by 20 per cent to 210,000. Figures in Africa rose from 118,000 to 135,000; and in the Near East from 49,000 to 55,000.

It follows, of course, that the horse and mule populations continue to fall. Whereas before 1939 there were 74.7 million horses in the world, by 1953-54 their numbers had dropped to 59.1 million. Over the same period the mule population dropped to 15.6 million from 18.4 million. But camels, used as pack and draft animals in countries almost untouched by mechanization, are more than holding their own in Asia and Africa. The camel population of those two areas rose from 7.8 million before the war to 9.7 million in 1953-54.

Wasps' Nests

Modern insecticides have replaced the dangerous cyanide preparations which were formerly used for destroying wasps' nests. Powders containing 25 per cent DDT or 25 per cent BHC, and derris powder (2 per cent rotenone) are all effective. Place a tablespoonful of the powder at, or just inside, the entrance to the nest. Returning workers stir up the dust with their wings and carry it into the nest, so spreading it among the others.

The wasps die within 24 hours, but if derris is used grubs and pupae may survive; after a day or two, therefore, the nest should be removed and

burned. There is no need to burn a nest treated with DDT or BHC, because these substances persist long enough to kill any emerging workers for two to three weeks after treatment. The dusting is best done in the evening when only a few guard wasps remain outside the nest. If the spoon is tied to a cane, there is little risk of being stung, even during the day.

The Original "Bramley's Seedling"

A chance encounter a hundred years ago between Henry Merryweather, nurseryman of Southwell, Notts, and George Musson, gardener to the Rev. Alfred Tatham, Canon of Southwell Minster, was destined to make pomological history. George was carrying a basket of apples which immediately took Mr. Merryweather's eye for their apparent fine quality. He asked where they came from, and was told "Mr. Bramley's garden". He went to see the tree for himself and thus, in his own words, "set to work to get up a stock". Today more than one-third of all commercial plantings of cooking apples are "Bramley's Seedlings".

The original tree, raised from seed between 1809 and 1813, is still growing comparatively vigorously in the garden of Bramley Tree Cottage, Church Street, Southwell, as can be seen from a photograph published in the June issue of the *Journal of the Royal Horticultural Society*. The lower part of the trunk, which has now been filled with molten crude wax, lies along the ground for about 5 feet, the first limb above it having apparently taken root. It is due to the attention given it by Mr. L. Lefroy about ten years ago that the tree is still in such good health.

The story of how the name of Mr. Matthew Bramley has falsely become immortalized by this apple, and of the patient search for truth which revealed that the pip was actually sown in the cottage back garden by young Mary Ann Brailsford and the seedling nurtured by her mother, is told by A. Simmonds in the *R.H.S. Journal* for April 1945. With greater justice, we might have had the "Brailsford Seedling"!

Marketing Cucumbers

A new British Standard (B.S. 2748:1956) deals with returnable single-layer and double-layer cucumber boxes. The single-layer tray has been used widely for a number of years and is regarded as the best for the purpose. It is included in the standard in order to ensure that its dimensions are maintained. The returnable double-layer box differs slightly from the various boxes that have been in common use, but after being well tested, it is considered the most suitable of its kind to meet market requirements.

Automation and the Sheep-Shearer

A Queensland, N.S.W. sheep farmer has introduced a degree of automation into shearing down-under. The sheep are shorn lying on their backs in cradles fixed above the edge of a circular table. Four shearers stand at the machines and each takes up part of the fleece as the sheep passes. A basket running on overhead wires receives the wool, which is then taken direct to the wool press.

BOOK REVIEWS

Agriculture (10th Edition). JAMES A. S. WATSON and JAMES A. MORE. Oliver and Boyd. 31*s.* 6*d.*

The publication of the tenth edition of "Watson and More" is ample evidence of its great value and interest to an ever-widening public. Since the first edition in 1924, the book has proved its worth not only to students at agricultural colleges and farm institutes, but also to practising and potential farmers. Each edition—and the latest one is no exception—has been written in language that the layman will have no difficulty in understanding.

The basic division of the book into four sections—"The Soil and its Management", "Crops", "Farm Livestock", "Farm Organisation and Management"—remains unaltered. This edition is, however, larger than its predecessor, as it includes additional information on recent scientific progress. The development of new techniques arising from this progress is also fully covered. The chapter on weed control is one example of the impact of new work, having been rewritten and considerably extended. The section dealing with farm machinery has been brought up to date and deals adequately with grain drying and storage. The illustrations here, and, indeed, throughout the book, are clear and helpful. The chapter dealing with animal nutrition has been revised and now includes a table listing members of the vitamin B complex and summarizing their importance in the feeding of pigs and poultry.

Probably the most striking change in farming in this country since 1949, when the last edition was published, has been the shifting of emphasis from maximum to cheaper, and hence more efficient, production on our farms. The management side of farming is therefore dealt with at greater length. The use of various "yardsticks" for testing farming efficiency is fully explained and an important section on farm budgeting is included. Not only does this include a tremendous amount of useful data, but it holds the interest of the reader throughout its length.

Many agriculturists already have this work on their bookshelf, and I strongly recommend the new edition to all farmers; it has a vast store of factual information and is invaluable as a book of reference, since it covers so clearly the whole field of the science and practice of farming in Britain today. The modifications in farming practice indicated as a result of modern research should provide interest and benefit throughout the country.

J.H.F.

The Pioneering Pig. NORMAN BLAKE. Faber. 12*s.* 6*d.*

By making an unorthodox approach to the subject of pig husbandry, this book gains interest. Mr. Blake has novel ideas about pigs and has, for all practical purposes, written a novel about them. This is not to say that there is any fiction in his work. Far from it, the book is brimful with sound observation. He has written the book because he likes pigs: "They are wise, active and thrifty; they don't wait for something to turn up; they turn it up themselves." And that is the main burden of his story. Pigs not only produce bacon; they can be used first to clear derelict or marginal land, then to improve it. In every way they can be pioneers in carving new farms out of land which lies waste. In the right hands, and managed in the right way, they can build up capital; they can be the stepping-stone (may I be forgiven) to better things! But the way is not easy. It means hard work and pioneer conditions for the owner as well as the pig. Unless you are weatherproof "put pig pioneering out of your mind".

From his thirty years' experience, Mr. Blake has given very sound advice on pig-keeping, using the minimum of equipment and the maximum of management skills. "Let no man set himself as wiser than the sow," he says, "unless he be one of a family of eight born on the same day, all raised to useful maturity!" If you set out to understand her requirements and treat her with the respect she deserves, she will do her job properly; otherwise you will have trouble. Over and over again, but never too often, Mr. Blake emphasizes this need to study the pigs and exercise skill in their management. That is the theme of the book, which is well worth reading not only because of its clear observations but because it stimulates a sense of adventure.

J.W.R.

BOOK REVIEWS

Trees, Woods and Man. (New Naturalist Series). H. L. EDLIN. Collins. 30*s*.

The admirable venture of the "New Naturalist" main series is intended to provide the general reader with accurate and readable accounts of all aspects of wild life in Britain. Since November 1945 some very fine books have appeared in this survey of British natural history, and the continuance of the series may be taken as an indication of its success. It is also a compliment to the public taste which seeks more and more the stamp of authority in its reading matter. Public interest in natural history seems to be growing rapidly, as the popularity of wild life television programmes testifies, and this demand is met by a profusion of publications, some of them quite irresistible to the book-lover as well as to the amateur naturalist. *Trees, Woods and Man* is Mr. Edlin's successful contribution to those few books which combine high quality with general appeal. It is beautifully written, widely informative and absorbing to read, whether the reader is a countryman or that general reader who so often can produce a country-bred relation within the last generation or so.

Mr. Edlin, like other authors who have contributed to this series, is a well-known authority on his subject with other books to his credit and, it is hoped, more to come from his pen. His plan is to describe the natural setting of trees and woods in the countryside, then look more closely at the woods themselves and see how they have fared through the ages under the influence of man. The final section tells us something of the trees themselves.

It is the first two sections of this book which are particularly interesting, especially the second, when man's influence is described with true understanding of what we need from the forests as well as our responsibility towards them if they are to continue to benefit the community. Every schoolboy knows that this island was heavily wooded in early times and that our present relatively small forest area is due to heavy depredations of these reserves without taking the prudent but expensive step of replacing them, or of attempting to manage a reducing area more productively. Our dilemma now is that we must use that which we admire and would preserve. Good woodland management is the way to achieve both economic return and aesthetic satisfaction from our woods; but the lesson has taken a long time to learn.

Some results of good forestry are illustrated among the excellent photographs and coloured plates which add to the pleasure of reading the book. Before it is torn and discarded, let there also be honourable mention of the attractive jacket cover designed by Clifford and Rosemary Ellis.

R.G.A.L.

The Solway Firth. (Regional Book Series). BRIAN BLAKE. Hale. 18*s*.

In the strictest sense, the Solway is "a Frith or Great Arm of the Sea", and the author has built his book around the simple fact that this inlet both joins and divides two landscapes and two countries. A glance at the table of contents shows that there is something in this book for everyone. The story begins with the solid rock, takes us through the turbulent history of the area, and leaves us, as it were, upon the threshold of the Atomic Age, or at least of an atomic factory. The ground surveyed, comprehensively and in fascinating detail, comprises the coastal area of Cumberland and those parts of Dumfriesshire, Kirkcudbrightshire and Wigtownshire which face it across the Firth.

Although industry has its place in this region, and is competently dealt with in a chapter of its own, the appeal of the book lies overwhelmingly in its treatment of the rural scene. The author's rather casual style tends to conceal the wealth of facts gleaned from diverse sources and, not least, from his own personal experience. We are taken to the water's edge; to the best place for a glimpse of the shy geese; into the water up to our waists with a haaf net and Bill Lawson (a local fisherman) for company; or across the sands to the stake net of his Scottish counterpart. Equally, the historical matter is so presented as to make it live.

Farming has its chapter, of course, and it will be a surprise to many to learn that the pattern of the countryside on both sides of the Solway is not very old; or that farming was once most backward on the Scottish side! From the days of the great Cistercian abbeys to the present, the author traces the development of farming, from the decay of sheep farming to the heyday of the drovers, and so to the present-day emphasis on milk production.

R.L.B.

BOOK REVIEWS

Proceedings of the British Society of Animal Production, 1955. Edited by I. L. MASON and G. WIENER. Oliver and Boyd. 15*s*.

A further record of progress ranging over many fields of research in animal husbandry is given in fifteen papers. The main emphasis lies on sheep management, and this journal, which is well presented and includes clear diagrams, starts with an interesting paper by J. M. Doney on hill sheep problems. He assesses the various factors for the much debated term " hardiness " and concludes that the weight of lambs at weaning time is the best single guide to adaptation and production. Further papers deal effectively with hormonal augmentation of fertility in sheep, the use of oestrogens in fat lamb production, practical prevention of pregnancy toxaemia, hypomagnesaemia and the control of parasites by widely differing management practices. Thomson and McDonald make an interesting contribution on the relation of weaning weight to birth weight of lambs. On similar lines, Johansson, writing on the Red and White cattle in Sweden, deals with the first lactation as a basis for selection for the dairy herd, as compared with the second and third lactations.

A contribution on the utilization of the herbage in various forms deals with an interesting aspect of the part which heather plays in the seasonal dietary of sheep, the fattening of pigs on pasture, and a careful investigation by D. S. MacLusky into the quantities of herbage eaten by grazing dairy cows. A relative field of study by D. R. Bath on " Bloat Onset in an Intact Dairy Cow Grazing New Zealand Pasture ", suggests no single, simple cause for bloat but a complex of factors, including pasture conditions, rate of grazing and method of feeding before grazing.

In view of current differences of opinion on evaluation of sires for breeding, the contribution of Robertson and Macarthur is of particular interest. The genetic differences between members of the small group of important bull-breeding herds which dominate each breed are assessed, and the writers find that, while the differences between studs are significant, they are small compared with those between bulls within studs. The results confirm previous conclusions that only a small fraction of the differences between herds in their yields is genetic and that, in fat content, the percentage is rather higher.

To complete a comprehensive list of proceedings for the year, is a report by A. R. Wannop on the Fifth Study Meeting of E.A.A.P. for which the selected theme was " Animal Production from Grass ". The account of the 1955 Summer Meeting of the B.S.A.P., given by A. P. Maule, indicates the virility of the Society and its variety of interests. These are exemplified by a study of the farming technique and practices as described by members and demonstrated by a tour of farms which typify methods of animal production in the north-east of Scotland.

T.G.

Milk Production in Dorset. (University of Bristol, Department of Economics Report No. 86). 4*s*.

Changing world conditions and economic factors invariably leave the effect of their impact on agriculture, and dairy farming in north Dorset has been no exception during the last twenty-five years. The old practices of renting dairies and of farmhouse cheese-making have now virtually died out. Today, intensive methods are needed to supply the liquid milk market, with consequent increases in winter production, changes in calving date, and other modifications in farming organization.

This publication fairly abounds with information about the 894 full-time milk-selling farms of the area. Yet it is pleasantly concise, with tables being used extensively to illustrate and elaborate the text. Full consideration is given to the effect of some of the main resources used in land, labour and capital, as well as to the presence of secondary enterprises. As might be expected where soil and climate dictate predominantly grassland farming, pigs and/or poultry are clearly seen to be the most popular subsidiary activities. Only 97 farms rely entirely on dairying; 311 farms have two enterprises, and 323 have three.

The section devoted to milk production data, with its references to density of stocking, types of herds, estimated value of output and labour, and, above all, the financial information will probably make the greatest appeal to the dairy farmer.

Milk Production in Dorset forms the second part of a dairy research study, and is a logical sequel to Report No. 85. Although the circumstances relate specifically to north Dorset, the booklet should have a wide appeal to dairy farmers and advisers and to teachers and students of farm management, since the information is applicable to many other areas of the country where conditions are similar.

J.R.E.R.

BOOK REVIEWS

Progress in the Physiology of Farm Animals (Vols. 1 and 2). Edited by J. HAMMOND. Butterworths. 45*s.* each.

The publication of this work has met the very real need of workers in animal husbandry to become acquainted with recent research in the physiology of farm animals—the fundamental basis for further improvement in the efficiency of production. Under the general editorship of Dr. John Hammond, several authors have written reviews of those fields where progress has been most rapid and in which they themselves have made significant contributions.

In the first half of Volume 1, K. L. Baxter, R. Braude and W. Bolton provide chapters entitled *Ruminant Nutrition, Pig Nutrition* and *Poultry* respectively, each presenting a comprehensive account of present knowledge concerning the manner of absorption and utilization of both common and less common constituents of food. D. P. Cuthburton reviews the field of *Trace Elements*. The second half of the book is concerned with environment, the growing significance of which is clearly drawn by N. C. Wright under the heading of *Ecology of Domesticated Animals*. J. D. Findlay and W. B. Beakley write on the *Environmental Physiology of Farm Mammals*, but confine their attention to the subject of heat regulation. J. C. D. Hutchinson covers *Heat Regulation in Birds* and, finally, the significance of light as an environmental factor is analysed by N. T. M. Yeates under the title of *Daylight Changes*.

In Volume 2 aspects of growth are covered in the first three chapters—*Liveweight Growth* by R. W. Pomeroy leads to *Growth and Body Composition* by H. Palsson, whose contribution is of particular importance in the light of the current attention paid to quality in meat. H. R. Marston gives a clear and essentially readable account of *Wool Growth*, but has omitted a bibliography—a most valuable feature of the other chapters. The second section of the volume is devoted to animal behaviour, presented on the one hand by D. E. Tribe (*The Behaviour of Grazing Animals*) and, on the other, by A. Walton, who gives a relatively short analysis of *Sexual Behaviour*. Possibly a less well-known field of research receives necessary emphasis in the chapter on *Mechanism of Movement* by C. W. Ottaway. Finally, R. M. Fraps reviews *Egg Production and Fertility in Poultry*. Since the whole field of fertility and reproduction is so important, it should be noted that other contributions will be given in Volume 3 of the series.

The work is encyclopaedic in its scope. There is some repetition, possibly leading to a little confusion, but this is to be expected as a result of the method of compilation and the difficulty of rigidly defining the specific subjects. More cross-references could have been included with advantage, and the index to each volume is at fault in not being comprehensive. However, such criticism is only a slight reflection on a splendid achievement and a work of reference which cannot fail to be of great value and inspiration.

T.G.B.

Birds and Beasts. (Shell Nature Studies). Edited by JAMES FISHER. Phoenix House. 6*s.* 6*d.*

What a delight these Shell Guides are! We have already seen *Flowers of the Countryside*, and now, from the same press, comes *Birds and Beasts*—of undoubted beauty in presentation and of unquestioned usefulness. Full-colour composite plates, keyed for identification of the birds and animals shown, and accompanied by short text matter, illustrate the field interest of each month.

Thus March and the approach of spring—" the scene of mating against the bare back-cloth of winter's end ", the time of moulting of the great-crested grebe, the skylark, wood-lark and meadow-pipit stand upon the threshold of song. Thus the dawn bird chorus, led by the nightingale, in a bluebell wood to herald a May morning, followed by lapwing, skylark, cock pheasant, cuckoo and the rest, until finally the cock wren " bursts into its explosion of hurried music ". Thus in October, at the edge of the oak-wood, the small tortoiseshell butterfly, the fly agaric toadstool, flamboyant against a dun carpet of fallen leaves, the harvest of acorns being garnered by squirrels, pheasant, jays and the impatient rook.

For the wayfarer with an observant eye, the countryside offers its varied riches at all times throughout the year. This book stimulates interest and shows something of what to look for.

S.R.O'H.

Preservation of Carotene in Dried Green Crops. V. H. Booth. Association of Green Crop Driers. 8*s.* 6*d.*

The provision of suitable vitamin A supplements for farm livestock which are intensively housed has long been a difficult problem. For pigs and poultry particularly, the need for supplementary vitamin A is well recognized, but what is the best type of supplement is still hotly debated. A variety of substances, described as "stabilized", "winterized", "protected", and so on, are now available, but whatever their respective merits there is still no doubt that none of them is ideal. Some are certainly easier to handle than others, but all lose their vitamin potency to some extent, and under certain conditions they may do so to a serious extent. Not one of them can be called absolutely reliable. At this time, when improved cod liver oils and new synthetic vitamin A powders have only recently appeared, this most readable bulletin is very welcome.

Dr. V. H. Booth is on the scientific staff of the A.R.C., and is therefore in a good position to make an impartial investigation into a problem which in the past has not always been so treated. His report deals fairly with all of the factors which influence carotene destruction, and he comments fully on the methods which have been suggested for reducing this loss. Although the bulletin is liberally annotated with references, the scientific reader will be sorry that a fuller account is not given of experimental details. However, this report is written primarily for those in the trade who are concerned with the practical steps they can take to reduce carotene loss, and for this type of reader the bulletin is ideal. In his final recommendations Dr. Booth makes several useful points. For example, his suggestion that crops should be divided into two categories according to whether they are intended for use as protein or carotene supplements—only the latter receiving protective treatment—seems eminently sensible. There is no doubt that some of his recommendations are so simple that they could be carried out immediately by any enterprising green crop drier.

There is, however, much that remains unknown in this field of nutritional inquiry, and it is to be hoped that this investigation will be followed by others, similarly competent, into such subjects as the effectiveness of antioxidants, the factors influencing carotene destruction after compounding, and so on.

Copies of this bulletin may be obtained from the Association at Cereal House, Mark Lane, London, E.C.3.

D.E.T.

Soil Survey of Great Britain. Report No. 7. H.M. Stationery Office. 4*s.* 6*d.* (4*s.* 7½*d.* by post).

The results of the organization of the Soil Survey of Great Britain seven years ago under the Agricultural Research Council are now beginning to be seen, as maps and memoirs on the soils of a number of areas are published. These are the first surveys of the kind produced in this country, except some published by the University of Reading and that on the Evesham fruit area made by the Ministry of Agriculture in 1949. The areas described and mapped are the Wem District of Shropshire, and the country round Banff, Huntley and Turriff. To these, since the publication of the report, has been added the Glastonbury district of Somerset, and in preparation are maps and memoirs for Anglesey, the Lleyn Peninsula, Jedburgh and Morebattle. These go some way to fulfilling the demand for detailed information on soil characteristics, cropping and farming practice in a permanent form for reference, similar to the publications which have been available for some time in the U.S.A., Canada, Australia and elsewhere. This seventh report gives brief accounts of the districts involved in the 630 sq. miles surveyed in 1954.

A useful factor of the soil maps is that they are on the same topographical (one inch) base map as those of the Geological Survey, so that direct comparison of soils and geology can be made.

While the mapping of soils in a programme designed to cover the whole country is the basic work of the Survey, its staff fulfils, as far as is possible, other demands for special surveys needed for more urgent purposes. Among these are one of the Romney Marsh for the Agricultural Improvement Council, with special reference to drainage and trace element deficiencies; another of the Worthing district in connection with the gradual removal of the glasshouse industry from the Lea Valley to Sussex; the detailed mapping of experimental farms for the Ministry of Agriculture, the University of Aberdeen and the North of Scotland College of Agriculture; and reporting on restoration of opencast coal and iron-mining sites in England and Scotland. Staff have also been lent to Aden, Somaliland, Iraq and Cyprus, and a pool of Colonial soil surveyors has been specially set up for future work of this kind.

J.B.E.P.

BOOK REVIEWS

Biology of Root-Infecting Fungi. S. D. GARRETT. Cambridge University Press. 30*s*.

The study of root diseases, so much more difficult than that of the more obvious diseases of aerial parts of plants, has developed from small beginnings during the last half-century. Dr. Garrett traces its growth from the early phase of identification of the fungi causing root diseases, followed by studies of the effects of environment, including temperature and moisture, to the present phase, entered some twenty-five years ago, in which pathogenic fungi are recognized as a minority in a teeming soil population whose members interact, compete for nutrients, produce antibiotics and limit each other's activity.

There are great technical difficulties in investigating the complex relationships between host roots, invading fungi, and soil with its abundant microflora. Dr. Garrett has himself made outstanding contributions to the subject, devising techniques and using them in a long and arduous series of studies, notably of Take-all of cereals. He has now performed the much more difficult task of integrating into a coherent and logical whole a mass of work by many investigators studying diverse problems. He has classified the soil fungi according to their behaviour and devoted different sections to those which inhabit the soil, the rhizosphere, and to those which invade roots as symbiotes, as facultative or as obligate parasites, suggesting ways in which these have evolved. He illustrates his ideas with a wealth of examples of diseases as diverse as those which cause damping-off of seedlings in the glasshouse and those which kill rubber trees in Malaya or cloves in Zanzibar.

The bibliography of more than five hundred references might suggest that the subject has received the attention it deserves. In fact, the study of root systems and their pathogens has been comparatively neglected, and offers a rich field for the investigator. Future work is likely to reveal unsuspected diseases taking their toll of our crops and to show how, by producing satisfactory root systems, yields can be increased. This book will do much to help and encourage further work in this fascinating, difficult and rewarding subject.

M.D.G.

The Sociology of an English Village. Gosforth. W. M. WILLIAMS. Routledge and Kegan Paul. 25*s*.

In Britain, rural sociology as a field of study has received little attention. This is in marked contrast to the United States, where considerable time and a lot of money have been devoted to it. A new British book on this subject is therefore welcome—doubly so when it contrives to be entertaining as well as instructive.

This is a study of a parish in west Cumberland, containing both lowland and "fell" farms and a large village. For many centuries Gosforth was extremely isolated, and even today boasts ancient customs lost to the rest of England. Many of the present families can trace a local history of 400 years or more, and it is not surprising that Gosforth places a high value on the ties of kinship. In this matter and many others, the parish shows marked differences from urban society, and the impact on village life of the values of this society, introduced into the district with the construction of the Atomic Energy Station at Sellafield, greatly adds to the interest of this study.

In addition to matters of primary interest to sociologists, Mr. Williams gives the agriculturist an opportunity to look at the farm from a new angle—always a salutary experience. Basically, Gosforth farm economy is dependent on the family farm, and the old patriarchal system still persists on many holdings, with full responsibility (and marriage) taking place late in the life of the inheriting son. Such a tradition is obviously of significance to the advisory worker and is one of the reasons why improved farm practices are adopted so slowly on some holdings. Equally significant is the strong dislike of officials (especially of "t' Ministry"), which can be explained by the prevalence in the parish of a strong sense of belonging to a community "different from and independent of the outside worldd". Another important manifestation of this community feeling is the marked development of neighbourliness, shown, for example, in the lending of implements and the immediate practical offers of help when illness occurs.

Although the book does not deal specifically with the farming community, many of the problems confronting advisory workers in hill and upland districts are mentioned, and at least it will be of interest to such workers to see these problems placed in perspective, even though it is not the purpose of this study to suggest remedies.

J.O'C.

BOOK REVIEWS

Dutch Potato Atlas. J. A. HOGAN, F. E. NIJDAM and H. SIEBENEICK. H. Veenman and Zonen. Wageningen, Holland. 69*s*.

The Dutch Potato Atlas has been compiled primarily to fulfil a need in Holland, where they now have considerable export trade of seed and ware potatoes, and with the hope that it will prove valuable to breeder, grower, dealer, and, indeed, to all concerned with potato varieties in any way. It is enterprising in that it is published in four languages and has, therefore, a much wider sphere of usefulness than might be supposed from the title.

Forty-six potato varieties of Dutch and foreign origin are described, and although only three British-bred varieties are included—Duke of York (grown in Holland under the name Eersteling), Arran Banner and Up-to-Date—two others—Bintje and Record (of Dutch origin)—are now well-known varieties in Britain. The descriptions are based on Netherland potato culture, and it is stressed that quite possibly certain statements will not be entirely correct for other countries. The English version is extremely well written with clear definitions, and it is obvious that the detailed records are a result of long investigation.

Plant characters are presented so as to give a general outline of growth, both as a plant and as a crop, with emphasis on essential features. The information on each variety begins with the maturity class and breeding, followed by descriptions of the growing plant, covering stems, leaf formation, flower colour and incidence. Sprouts and tubers are described in much detail, bringing out those characters which are of most value in identification and making up a mental picture of the general appearance of the variety.

Important information is set out in the paragraphs on resistance to disease, in which mention is made of the main diseases affecting the potato—such as Blight, virus diseases, Common Scab—internal defects of the flesh, and proclivity to second growth. A paragraph which will be very much appreciated by British growers is that entitled " Agricultural Value ", dealing with the response of each individual variety to different soil types and the influence of certain cultural methods. Another note on " Utilization and Cooking Quality " rounds off the practical information applicable to the trade generally.

Facing this descriptive matter of each variety is a coloured plate showing type and colour of the sprout at two stages, tuber shape, depth of eye, skin and flesh colour, and the leaf. The latter illustration is particularly commended for the manner in which it shows characteristic formation and setting of the leaflets and secondary leaflets, which are some of the main features in identification. Flowers and anthers and the set of the inflorescence are also shown in colour, the whole indicating that much time and thought has been taken in the preparation of these delightful illustrations. The book is in loose-leaf form so as to accommodate additional descriptions as published, and is bound in an attractive plastic calf-type cover.

It is to be hoped that this first-rate publication will inspire some section of the British potato industry to produce an atlas on similar lines embodying existing knowledge on potato varieties in commerce in the United Kingdom.

N.McD.

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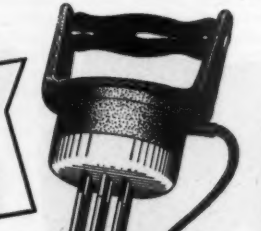

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Soil Analysis, in which N. H. Pizer, Provincial Soil Chemist, N.A.A.S., examines the problems arising in the application of soil analysis techniques to cases of suspected deficiencies and excesses of elements.

Bovine Mastitis, a survey by Ian Davidson of the Ministry of Agriculture's Veterinary Laboratory Weybridge, on the present situation in mastitis control, with references to bacterial cause and various environmental aggravating factors.

Spring Mechanisation in Sugar Beet, by G. L. Maughan deals with the use of rubbed and graded seed, levelling techniques and methods of seedling reduction.

Sprouting Potatoes in Artificial Light, C. V. Dadd considers the value of fluorescent lighting, its installation, the buildings and temperatures required.

Trends in Farm Building Practice in the U.S.A., by A. J. Langdon, is a brief review of interesting developments in pre-fabricated building materials, 'loose housing', mechanical mucking-out methods, self-feed arrangements, etc.

These are just some of the many features in a stimulating and informative issue. In addition, there are other articles and the usual monthly features—book reviews, abstracts, etc., and a comprehensive economic review prepared by the Economist Intelligence Unit.

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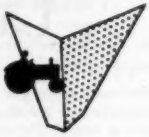

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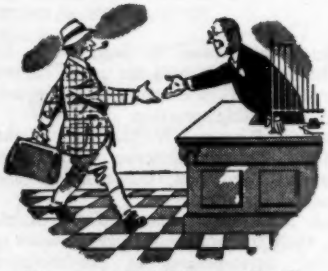

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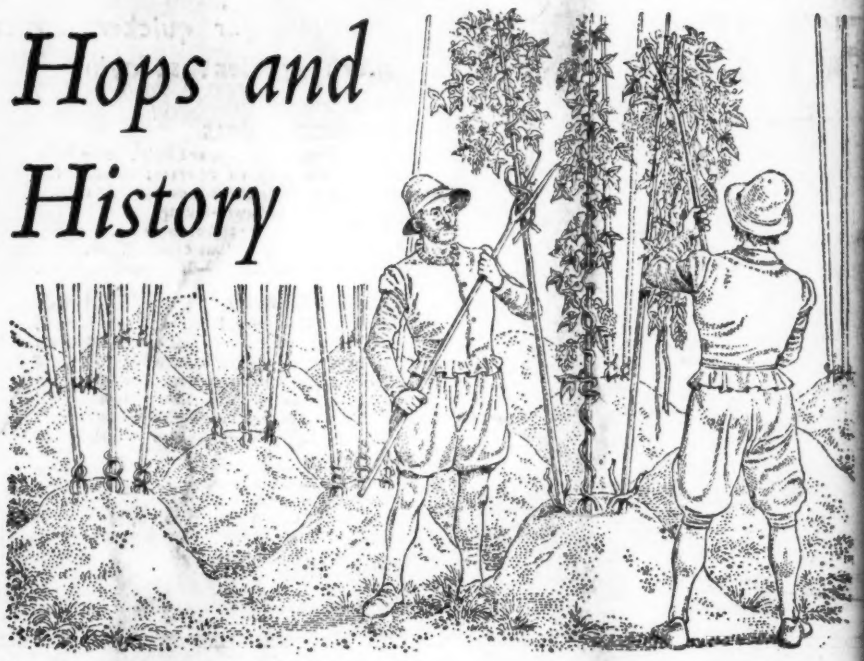

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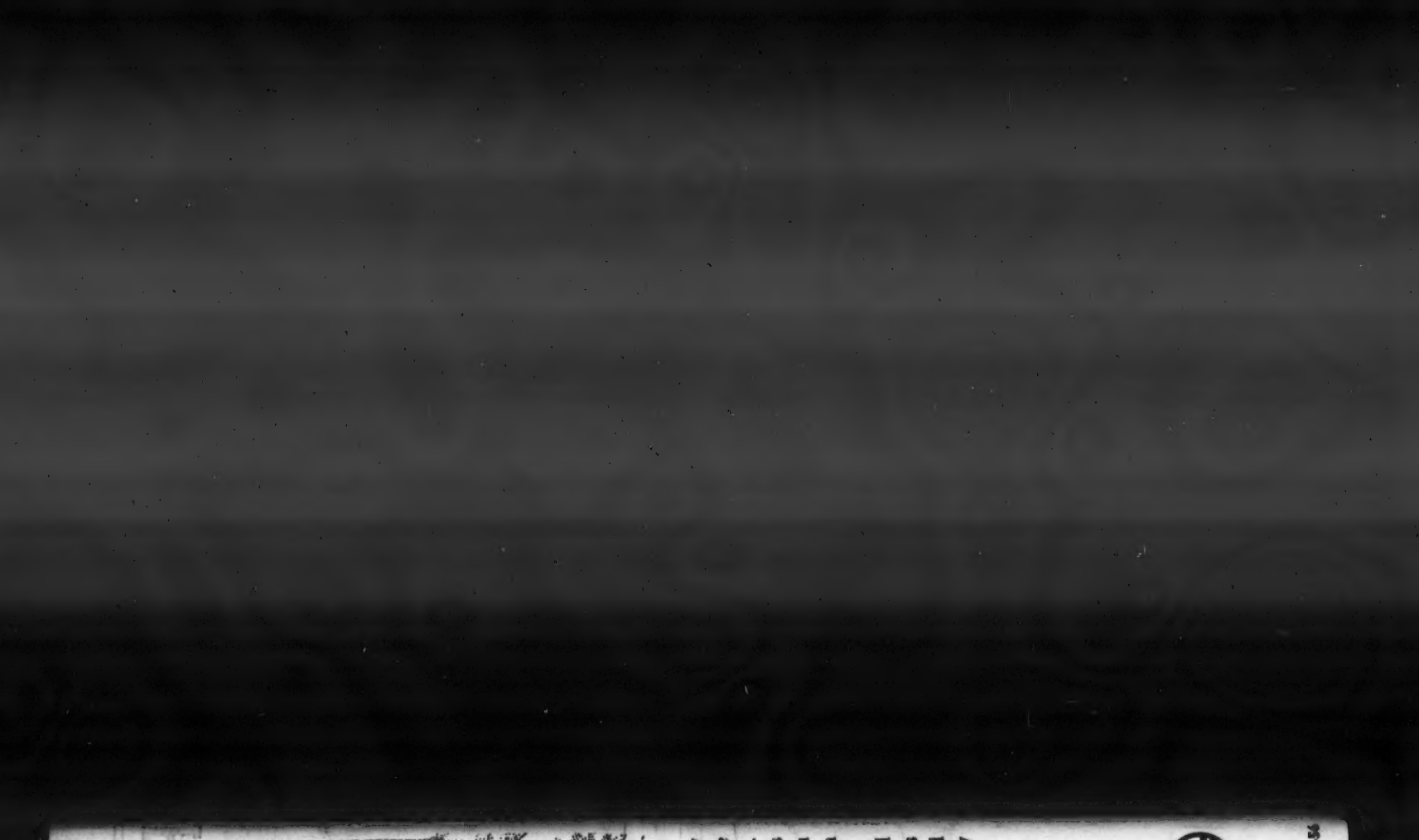
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